

OBSERVATIONS
ON SOME POINTS
RELATING TO THE ANATOMY, PHYSIOLOGY,
AND PATHOLOGY
OF THE
NERVOUS SYSTEM.

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Non vescor, nequid timidè, nequid stultè facias, si ea defendes, quæ
ipse reeta esse senties. — Cic. Ep. ad Fam. Lib. 2. Ep. 7.

L O N D O N :
PRINTED FOR
LONGMAN, HURST, REES, ORME, AND BROWN,
PATERNOSTER-ROW.

1822.

BIBLIOTHECA
COLLEGIUM REC.

PREFACE.

IT is the author's utmost wish to be useful to the profession in which he is engaged, and as he is not without hope that this object may be in a small degree attained by the following papers, he has ventured to publish them in their present imperfect state.

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By the same Author.

A DISSERTATION on the TREATMENT of
MORBID LOCAL AFFECTIONS of NERVES,
to which the JACKSONIAN PRIZE was adjudged by the
Royal College of Surgeons.

ALSO,

An ACCOUNT of a New Method of making Dried
ANATOMICAL PREPARATIONS.

ERRATA.

Page 70. line 24. *for "the fifth of December" read "the twenty-eighth of November."*
— line 25. *after "seventh" read "of December."*

OBSERVATIONS,

&c.

CHAP. I.

ON THE DISTRIBUTION OF NERVES.

WHOEVER has prosecuted the anatomy of the nervous system attentively, adverting at the same time to its physiology and pathology, as far as they are already known, can hardly fail to be convinced that every organized part of the animal body is supplied with nerves. And as different degrees of perception are called for in different parts of the body, so we find them supplied, in a greater or less degree, with nervous branches accordingly. The most important parts are those which are the seat of the senses,

and these are, therefore, furnished with the greatest number. Next to these in importance are the muscles, whose actions are of such concern to the body, and which are furnished with nerves in proportion. The viscera, the glands, and blood-vessels, also receive many nerves. Whilst the other parts, for example, the tendons, ligaments, bones, &c. being as it were passive in the body, and never acting of themselves, contain only a small proportion of nervous branches compared with the others; no more, indeed, than we might suppose to be necessary for maintaining a degree of living action sufficient to preserve them from injury, and to form that connection with every other part, without which it would be impossible for them to perform their functions harmoniously with the rest.

With such a variety in the quantity of nerves distributed to the different parts, can we wonder that there should be so much difficulty in tracing the small branches in the least sensible of them? Or, because this cannot always be accomplished, are we to consider that such parts are therefore destitute? In my opinion certainly not.

So complicated is the structure of an animal body, that however diligent an anatomist may be in acquiring the art of separating its different textures, or however great the nicety he has

arrived at in his operations, it is impossible for him in many parts of a body to see how the ultimate particles are disposed. In no respect is this more true than with regard to the nerves. The arteries and veins, and absorbents, may be so filled with different substances, that by the aid of a microscope they may be traced with tolerable accuracy almost to their terminations.

But with the nerves it is very different, for these the anatomist can only trace to a certain extent, with a sufficient assurance that what he is following is nerve. When he gets beyond this point, the branches become so similar to many parts which surround them, that, in my opinion, it is impossible for any one to take up a part, and say he can separate these minute branches from the surrounding substances, so as to be able to declare they are nerve. Nevertheless I am persuaded that this may be done to a much greater extent than is commonly imagined, when they are carefully traced from the branch which produces them. By the most careful examination, I have traced nerves in many parts of the body, until they have appeared to terminate in a very delicate membrane, which was found, on investigation with a magnifying glass, to consist of a plexus of very minute nerves.

We are apt, I think, to be too much guided by notions we have early imbibed, respecting the form, substance, &c. of the various parts of the body, and we cannot at first reconcile it to ourselves with regard to the nerves, that any thing in the form of a thin membrane can perform the functions of a round or thick rope-like substance. We see this, indeed, with regard to the termination of the optic nerve in the retina, and admit it, because it is so obvious, owing to the parts connected with it being so loosely put together, that we can separate them from it, and examine it in a manner the most satisfactory. But in other parts of the body, the nerves pass into organs with which they are so interwoven, and whose texture is so firm, that we cannot separate them sufficiently to have a view of their exact termination. I had very frequently traced nerves till they appeared to be lost in a fine membrane, and had wondered that a strong branch should be lost in this manner, never supposing that this was its mode of termination. In studying comparative anatomy, I found an explanation of this circumstance. I was particularly struck with it in dissecting the nerves of the horse's face, and likewise in the penis of the calf. In the horse's face I found the trunks of the nerves having a very flat appearance, and

the continuations of them having a round and thicker form ; and in several places I satisfactorily observed that membranous and plexiform appearance with the naked eye which nearly resembles the magnified termination of the minute nerves in the human body.

The plate representing part of the nerves of the horse's face *, will give a better explanation of this appearance than I can by words. I will not in the present state of our knowledge of the nervous system decidedly say that this is the termination of nerves, but with every reason to justify the supposition that it is so, will leave it to the judgment of others, after they have investigated the subject with sufficient care and attention.

† This termination may be seen in a muscle, and many other parts : and when a nerve has resolved itself into this membrane, and has to spread itself over the whole of this muscle, will any one take upon himself to trace it throughout every part, or because he cannot follow it into every bundle of muscular fibre, will he therefore say that such fibres have no nerves ? And if this cannot be fairly asserted, in like manner when we have traced a nerve to any other part,

* See Plate I.

† See Plate II.

and found its termination similar to that in the muscle, may we not conclude that the whole of this part is likewise supplied with nerve?

In dissecting the nerves I have lately been much surprised to find how far I could trace minute branches, without their having appeared to be much diminished in size, and I had supposed that they terminated very much nearer their trunks, than proved to be the case on my using great care in following them. From this I conceive that minute filaments may be extended to a very great length, as in the peritoneum, and many other parts. Some may suppose this very improbable, and that after being extended to such a length, they could not perform the functions of nerves; but length does not seem to diminish the power of a nerve, as in different animals we find the same nerve for the same purpose lengthened according to the part it has to pass over; of this, the par vagum may, perhaps, afford the best illustration. In the swan what a length it travels before it reaches its destination!

In different parts of the body, as I have already observed, the number and size of the nerves vary, and, according to this variety, the parts are more or less sensible, provided they are in a healthy state. In disease the case is

otherwise ; for then it appears that the most unyielding parts, as bone, &c., or such as cannot be distended, become the most painful. Pain, from alteration of structure, need not depend on the quantity of nerves distributed to a part, for we find a single filament, when distended, as by a tumour, sufficient to produce the most exquisite anguish. But where there is disease in a part, and pain, we are warranted in asserting that the part is supplied with nerves, as there is no pain when the communication with the brain is intercepted, either in consequence of a division of the nerves going to the part, or from some disease between this part and the brain.

Having explained how nerves are distributed to muscles, and there being no doubt but that many other parts of the body receive them, to which they have not been actually traced, I will go on to mention those structures in which their existence has been either denied, or unsatisfactorily proved.

To trace nerve into the substance of a bone I found very difficult, and the first time I accomplished it was in a portion of diseased tibia.
* The branch entering the bone was of considerable size, so as to leave no doubt of its being

* See Plate III. Fig. 2.

nerve. It was derived from the saphænus nerve, which was enlarged from irritation considerably beyond its natural size. The second time I traced it was in the fibula. In this* a considerable branch was given off from the posterior tibial, which gave many filaments to the periosteum and the substance of the bone.

I have often traced nerves to the † periosteum, and this may be the most easily done in various parts of the tibia, the anterior surface of which receives many filaments from the saphænus. Branches may be traced to it from the posterior tibial, and several muscular branches send filaments from the midst of the muscle.

I have traced nerves to the tendons in the back of the hand from the ‡ radial. Filaments from the digital nerves creep into the thecæ, and enter the tendons. §

I have traced nerves to the ligaments ; a considerable branch enters the knee from the posterior tibial. Filaments may be traced to the posterior ligaments of the wrist from the radial and dorsal branch of the ulnar, and likewise from the posterior interosseous. In the foot many branches

* See Plate III. Fig. 1.

† See Plate III. Fig. 1. *a. d.*

‡ See Plate IV. Fig. 2.

§ See Plate IV. Fig. 1.

may be traced to the ligaments from the deep branch of the anterior tibial. Branches may be traced from the grand sympathetics to the ligaments of the spine.

The deep branch of the anterior tibial nerve forms a * gangliform enlargement, and branches or expansions of this may be found in contact with the synovial membranes. Branches may be traced from various nerves to the thecæ of tendons, and may be seen entering the joints of the foot from the deep anterior tibial.

Nerves may be traced to the fasciæ, especially from the branches of the anterior crural nerve in the thigh and leg.

Nerves may be traced from the grand sympathetic to the peritoneum forming the mesentery, and likewise to the pleura; branches may be also traced to this latter membrane from the par vagum. Branches may also be traced from the par vagum, phrenic, and grand sympathetic nerves to the pericardium. I have given a † representation of the branches going from the phrenic nerve to the pericardium in the calf; for though I had dissected them in the human subject, I had no preparation of them, and an

* See Plate V.

† See Plate IV. Fig. 3.

opportunity of repeating the dissection did not occur in proper time.

I have thus given an account of nerves distributed to most of the structures of the body, which it is the most difficult to trace. At a future time, when I shall have prosecuted the anatomy of the nervous system farther than I have yet done, I trust I shall be able to offer some observations on the production of morbid sympathies.

CHAP. II.

ON DISEASE OF THE PAR VAGUM.

THE Rev. Mr. Deacon, of Waddington, aged sixty-two years, had been attacked with gout when only seventeen years old. For many years he had very frequent fits of it, and was so much crippled in consequence, that the joints of his fingers were continually enlarged, and contained many chalk-stones. He took the eau medicinale for a long time, which never failed to relieve him ; and for this he substituted Dr. Wilson's medicine, which he took for several years with the same effect. He was cautioned against taking these medicines so frequently, but to very little purpose, as by their use he was freed from a fit in a few days, when no other means restored him to an equal state of ease in several weeks. The functions of the stomach in the last seven years had frequently been impaired, but for the last eighteen months he generally had a great appetite, but never felt satisfied ; and if he ate ever so much, he had no sense of fullness. On the 21st of June 1820, he was taken with great pain at the stomach,

after eating a hearty dinner. He took an emetic, in consequence of which his stomach ejected a quantity of food, chiefly chicken, which though it was full four hours after dinner, was not in the least digested. Nov. 19, he began to have a difficulty of breathing, which was only perfectly relieved either by a fit of the gout, or the vinous infusion of the colchicum root. When the difficulty of breathing was the worst, he made a whistling noise, as though the glottis was contracted. For some time he was quite free from it. But in the summer of 1821 he had a violent attack of it, which was thought to have been produced by cold, when the gout came on and relieved him ; he took the vinous infusion of colchicum, which removed the gout, but it purged him so violently, that an opiate was given him to restrain it. He began to sleep from this time, and continued so for three weeks, except he was roused, when he seemed to know every one about him, but had neither recollection or judgment beyond this. Leeches, blisters, &c. seemed to relieve him in some degree, but he was not materially better until he took the vinous infusion of colchicum again ; after which he continued to mend gradually, but the difficulty of breathing soon returned ; and though it yielded once or twice more to the vinous infusion of the

colchicum, which always purged him, no lasting good effect was produced. The difficulty of breathing continued, with different degrees of violence, till the time of his death. He never had pain in the chest. His stomach remained in the same craving and insensible state to the last. His body for many months had been becoming more and more emaciated. His pulse was generally natural, but very strong. For several weeks he could not take opiates of any sort, or in any quantity, as they made him so uncomfortable. About ten days before he died, he had a tea-cupful of blood taken from the arm, which somewhat relieved his breathing. He, at this time, had much gouty inflammation in his hands. The blood was very much cupped, and had a strong buffy coat, but the next day he was so very faint, that he could with difficulty sit in his chair. He had a cough, which was occasionally troublesome. As nothing seemed to relieve him, and as his state appeared to me to be much approaching that of an animal whose eighth pair of nerves had been divided, he was galvanized. He thought the two first trials gave him some relief. A few nights before he died he was taken with difficulty of breathing to such a degree, and seemed so exhausted, that some wine was given him, and galvanism was

again tried. After the first ten minutes, the noise in his breathing left him, and he kept breathing more and more easily, so that when the galvanism had been used for half an hour, he laid down and slept better for several hours, than he had done for some time before. The galvanism was repeated the next day, and he thought himself relieved by it; but this relief was of short duration, for his breathing soon became as bad as ever, and he died a few days after, on the 22d of September.

Within the last three weeks he had been obliged to rise in the night, and sit up a great part of it. Owing to this his legs swelled a little, as he was unable to have them in a horizontal position when he sat up, in consequence of his knees being much contracted. About ten days before he died, purple spots appeared on his feet, and then on the rest of his body; these, however, disappeared entirely in three or four days.

His symptoms never were those strongly marking hydrothorax; and his countenance had not the expression usual in this disease.

I cannot help concluding that the whole of the above symptoms were produced by the powerful action of strong medicines on the stomach. It always appeared to me that the

par vagum suffered in consequence, and, I think, the craving for food, and the want of a sensation of fullness after eating ever so much, showed the nerves, at least, had lost their sensitive qualities. Add to this, the difficulty of breathing, with the noise in the larynx when this was bad, and, I think, it must be concluded that these effects were produced by a diminished energy of the nerves. As I have before observed, the symptoms never were those of hydrothorax; and though there was fluid in the chest, I conceive that it had only collected there a short time before he died, and that it was produced in consequence of the difficult transmission of blood through the lungs.

Hydrothorax frequently attacks dram drinkers, and may not this be the consequence of a deranged state of the eighth pair of nerves, in the same manner as I have supposed the disease to have been produced in the preceding case?

EXAMINATION.

September 24th. On opening the abdomen every thing appeared sound. The outside of the stomach was covered with an unusual quantity of veins, but the inside of this viscus had nothing particular in its appearance.

On opening the chest there was much fat. The heart was enlarged and fat, but otherwise every thing about it had a healthy appearance. In the pulmonary artery one corpus sesamoideum was larger than the rest ; and in the aorta, one corpus sesamoideum was not situated at the edge of the valve, but about its middle.

Each side of the chest contained about two pints of a dark coloured fluid. The lungs were not collapsed, but appeared otherwise healthy.

On tracing the par vagum from the middle of the neck, each nerve was flabby, and much smaller than natural, and felt like nerves removed from a putrid body after having been soaked in water. The branches distributed to the lungs appeared as is usual, as did the continuations of the nerves, nearly as far as the termination of the æsophagus, when they were found redder and thicker than usual, and had not a healthy appearance. The left nerve was smaller than the right.

In order to be better satisfied with regard to the diminution of the size of the par vagum stated in the preceding case, I was led to compare the appearance of it as there related with that in other cases ; and in dissecting two sub-

jects destroyed by consumption, the left lungs were diseased in a much greater degree than the right; both trunks of the par vagum were smaller than they should be, and especially when compared with those of a subject destroyed by empyema where the lungs were sound ; and the left trunk was smaller than the right. In both of these subjects, as well as in another, very considerable disease existed in the intestines. In one I examined the alimentary canal from one end to the other ; and through its whole length beyond the stomach, very little space was left where ulcerations of the mucous membrane did not exist, most of them varying in size from a pea to half-a-crown.

Respecting such a dreadful disease as consumption, I think any facts are of importance ; and it might be well worth while to step out of the beaten track, and enquire what is the deficiency in the body which exists as the predisposing cause.

I have stated the above facts, respecting the par vagum, as they presented themselves to me. Whether they have been only accidental occurrences, or the usual concomitants of similar diseases, must be left for future observation to determine.

CHAP. III.

ON ULCERATION OF NERVES.

IT must have occurred to every surgeon to have witnessed patients lingering out a miserable existence under the severest sufferings, without having it in his power in many instances to mitigate them in any material degree ; and it is from my having observed the agonies of patients suffering from some ulcers on the legs, and my inability to relieve them, that I have attempted to investigate their nature more accurately, in order that, if possible, some method hitherto not practised might be resorted to, which would hold out a prospect of relief ; and though, for want of sufficient opportunities, I have not succeeded to the utmost of my wishes, yet I think the result of my researches, contained in the following pages, may not be uninteresting to the profession.

When an ulcer forms on the outside of the leg, and continues small, and does not extend deep, though it be of an irritable nature, it may be cured ; but when it has extended far,

and become deep, it can hardly fail to implicate the nerves which are about it, by communicating an inflammatory disposition to them, which increases the irritability of the parts, and so causes the ulceration to extend till the nerves themselves become ulcerated. When this happens, the irritation increases, and there is frequently then such an increased action of the blood-vessels, that, first of all, the parts immediately surrounding the ulcer become enlarged, and then this disposition gradually spreads over the greatest part of the limb. The skin is increased many times in thickness, and the bones themselves are enlarged. The muscles and tendons become involved in the ulcerative process, and even the parts that escape are so altered as hardly to be recognized. What I have described is the usual progress of the disease when it has been uninterrupted in its course ; and when it has reached this state, the constitution becomes so worn out by the continued sufferings, that the patient must die if the disease be not removed.

In the case of William Sharpe, related in my Dissertation on the Treatment of Morbid Local Affections of Nerves *, two nerves were in a

* Page 70.

state of ulceration. In the following case, though the trunks of the nerves were not exactly ulcerated, yet they were so connected with the diseased parts, and many branches from them were distributed in such a manner to the fungus, as to occasion the same symptoms.

CASE I.

Susannah Hostler, aged forty-three years, unmarried, and having scars from scrofula in most parts of the body, was admitted into the County Hospital on the 27th of August, 1820, with a large fungous ulcer in the lower part, and chiefly on the outside of the left leg.

The formation of the ulcer was preceded by a white scale and ichorous discharge, and after the separation of the scale it began immediately to increase. It had existed between two and three years, and from its first commencement caused violent pain. About the Christmas preceding, it began to have a fungous appearance, accompanied with a most fetid discharge, and she had since suffered excruciating pain in it, which darted down to each of the malleoli and top of the foot. The pain she experienced was continual, but became the most violent in the night, and generally came on about the time

she was going to sleep. Towards morning she would fall asleep, but never slept more than two or three hours, notwithstanding she took a large teaspoonful of laudanum every night. Various escharotics had been applied to the fungus with a view to its removal, previous to her admission into the hospital. The only thing that ever gave her relief was the application of ten leeches to the ulcer.

She had a bad appetite, a quick pulse, looked very pale, and was so much emaciated as to lead me to suppose that it would be impossible for her to live long in her present state ; and as it appeared vain to hope that any remedies could lessen the disease in a short time, and that if there was much delay, no chance of saving her life even from amputation would remain, I therefore amputated the limb above the knee on the 30th of August.

The day before the operation, she had great tenderness in the inside of the thigh, but this had gone off before the next day.

A few days after the operation she began to improve in her health, and was discharged cured from the hospital about the middle of October.

The day after the limb was amputated, I injected it by the popliteal artery, first with white

spirit varnish and vermillion, and then plaster of Paris and vermillion mixed with water.

On dissecting the limb, the external popliteal or fibular nerve was found much larger in the lower part of the ham than it was higher up. The cutaneous branch which unites with a branch of the posterior tibial, and is distributed to the outer side of the foot, could be easily traced until it came near the fungus, with the posterior part of which it became quite blended * ; and was then so much enlarged and confused, as not to appear like nerve ; but when it got beyond the fungus it again had its natural appearance.

The anterior tibial nerve † could be traced easily until it came near the fungus, but was then covered by a firm and very vascular membrane, from which it could hardly be separated. This was the case most of the way through the fungus, after which it had a more natural appearance.

The fibular nerve could in the same manner be traced to the fungus, when it exhibited nearly the same appearances as the anterior tibial. Just at the beginning of the fungus it gave off to its base many branches ‡, which

* See Plate VII. fig. 1.

† See Plate VI. A.

‡ See Plate VI. B. B.

were very much enlarged in consequence of the irritation.

Small filaments were distributed to the surrounding parts from all the three nerves that have been mentioned, but none of them had the same disposition as the branches of the fibular nerve I have just described.

The skin on a great part of the leg, but more particularly about the ulcer, was very much thickened. The bones were enlarged from the local inflammatory action, but did not appear otherwise diseased.

The muscles were so much wasted, and had such a diseased appearance, as to be hardly recognized.

In describing the fungus, I shall divide it into two parts; viz. the base and the spongy part.

The base appeared to consist chiefly of an intricate plexus of blood-vessels *, and led me to conclude that such a structure is peculiarly capable of producing the spongy part. In this instance it received many branches of nerves besides having connected itself to the nerves beneath it.

The spongy † part arose like threads from the

* See Plate VII. fig. 4.

† See Plate VII. fig. 3.

base, whilst sometimes numbers of them appeared to proceed from a small point : these threads were hollow*, and frequently communicated together, so that this part when inflated by a blow-pipe had very much the appearance of a piece of sponge. The blood-vessels went from the base towards this part †, and were largely distributed to the inside of the cells, which appeared to me to secrete the discharge in the same manner as the mucous follicles in different parts of the body. In the magnified drawing of a portion of the dried fungus, there appeared to be a nervous fibril which was distributed to the spongy part. ‡

It had always seemed to me very difficult to account for the immense discharge in fungous diseases from a surface of a given size, compared with what is usually secreted by an ulcerated surface ; but when we consider that the size of the surface is multiplied by the structure I have just described, our surprize will in a great measure cease.

From what I have stated, I think it will be seen why escharotics will not cure a fungus. The reason seems to be this ; that they only de-

* See Plate VII. fig. 2. † See Plate VII. fig. 3. and 5.

‡ See Plate VII. fig 5.

stroy the spongy part, and do not reach through to the base that forms it.

A fungus is painful or not, according to the parts it has implicated in its structure. At first it has not apparently a very inflammatory disposition, and does not extend deep; but afterwards this inflammatory disposition increases, and extends to the parts deeper seated beneath the fungus; and then, if there are any considerable nerves in that situation, they become connected with it, partake of the inflammatory disposition, and produce excruciating pain.

The subjects of cases similar to the one I have related are, I conceive, amongst the greatest of human sufferers; and though when the disease has reached its utmost limits, it can only be removed by amputation of the limb, this is an operation which in such cases I was always averse to perform; as, from observing the almost constant pallid appearance of the patients, I conceived a disease of the constitution to be the principal cause of the complaint; but since I now find it is in great measure a local complaint, and produced and kept up by circumstances which the situation causes, the attempt, I think, ought to be made, with a view to preserve the sufferer, when he is in danger of

sinking under the disease, provided no method of procuring ease can be discovered ; but I am not without hope that such a discovery may be made, by which, though the ulcers may not be entirely cured, the agonizing pain may at least be materially mitigated.

When a patient is suffering very excruciating pain from an ulcer on the leg, of long standing, and the usual remedies have failed, what I would recommend as the most probable method of relieving him, would be to cut out a portion of the nerve or nerves, which we know from the situation must be affected.

Whether this treatment will have any effect on the growth of the fungus, I am at present unable to say ; but if it has not, the only way of removing it seems to be, either to cut it out with the base on which it is formed, or to destroy it by powerful caustic.

After I had made the preceding observations, the following case occurred to me :

CASE II.

William Richardson, aged forty-eight years, was admitted into the County Hospital on the 21st of October, 1820, with a large ulcer

on the left leg. It began about the middle of the leg, and reached nearly to the instep. It extended across from beyond the inner edge of the tibia to the fibula. Its appearance was that of an exuberant mass of granulations, such as is frequently observed after severe burns. It bled very profusely, and had done so for four months. It was attended with excruciating pain, which hardly ever allowed him to rest, and it was so bad at night as to oblige him to get out of bed. The pain came on with violent stabs like spasms, which extended up the outside of the leg to the ham, and from thence to the back, and in these paroxysms the limb would frequently be moved involuntarily. The pain was almost entirely confined to the external popliteal nerve ; for when I pressed it in the ham, it produced or aggravated the violent pain. Upon taking into consideration the size of the ulcer, the emaciated state of the patient's body, the excessive pain and profuse hemorrhage, I told him that I had a very unfavourable opinion of his case ; that I was afraid I could not cure the ulcer, and that I saw very little prospect of saving his life, except by amputation of the limb. I found him resolved to make this sacrifice, as he felt he could not long survive the terrible anguish he endured : but as I knew that the branches of

the external popliteal or fibular nerve were the principal cause of the pain, from their connection with the ulcer, I determined first to give him the chance of saving his limb by cutting out a portion of the nerve.

In performing this operation I felt for the outer ham-string, and then made an incision about two inches long just at its inner edge. This divided the skin and fat, and brought to view a thin tendinous fascia, and immediately on dividing this the nerve was exposed. A probe was passed under it, and after desiring that the limb might be held firmly by assistants, I passed under the nerve a probe-pointed bistoury, as near to the superior part of the wound as possible, by which I divided it; and then having separated it from the surrounding parts, I removed, as near as could be guessed, an inch of it. I then brought the edges of the wound together with adhesive plaster and a bandage, and had the patient removed to bed. When the nerve was divided, an artery bled very freely, and I was afraid it would not have stopped of itself. After the nerve had been divided, the pain in the ulcer entirely ceased, and he had no feeling on the top of the foot when it was touched.

Oct. 22. He has had a good night, and has

no pain in the ulcer, but has a little in the wound. No fever.

23. He has had a good night. The pain in the wound continues. He says he has perfect sensation in the upper part of the foot. No fever.

24. He had an indifferent night. He had pain in the ulcer, which he thought arose from the too tight application of the bandage: the pain went off at three in the morning, after which he slept. There has not been any discharge of pus from the ulcer, or any hemorrhage since the operation, but the ulcer has the same appearance.

25. He has had a good night, and has been entirely free from pain since the ulcer was dressed yesterday.

26, 27. He has had good nights.

28. He had an indifferent night. The granulations of the ulcer are not so high.

29. The wound was dressed for the first time, and was found to have united by the first intention.

The wound made by the removal of the nerve hardly caused any inconvenience. After the operation, he never had any of the spasms in the limb, or any of the violent pain which followed the course of the sciatic nerve, and caused

so much suffering. His state was rendered much more comfortable by the operation, but he still at times suffered pain from the connection of the saphænus nerve with the ulcer. For some time he appeared to improve in his health. But several small particles of bone kept exfoliating. I afterwards removed two small portions ; and one large piece, nearly the whole circumference of the tibia, having become loose, I extracted it. In about six weeks after the operation, he began to be troubled with a diarrhœa and night sweats ; and as his health appeared to decline, and the ulcer was so large, and the bone still much diseased, I amputated the limb above the knee, on the 25th of December, and he soon got quite well.

He continued in good health until the middle of March, when on being too much exposed to the weather, he caught cold, which brought on a disease of the lungs, of which he died about the middle of July.

On examining the limb the day after it was amputated, the tibia was found to be affected with necrosis quite through ; and where the bone was alive, for some distance it appeared to be affected with caries, from which the spongy granulations grew.

The periosteum of the whole bone was thickened.

The saphænus nerve was very much enlarged, and was connected with the ulcer.

The sciatic nerve was enlarged. The external popliteal or fibular nerve was also enlarged, and at the place where it had been divided was much thickened; and one* new branch went from this part to the anterior tibial nerve. The junction of this branch with the anterior tibial nerve was at the inside of the nerve; and from the manner in which it is situated, I think it not improbable that some other branches, forming a medium of communication between the divided portions of nerve, might have been destroyed in the dissection. New branches went from the same portion of the divided nerve to the fibular nerve, and to the surrounding parts.† Both the anterior tibial and fibular nerves were larger than in their natural state. The new branches that went to the fibular nerve, and the surrounding parts, were flatter than we usually see nerves of the same size, but as far as I can judge they were new nerves.

No inconvenience seemed to arise from the removal of the nerve. Whether the new branches

* See Plate VIII. *g.*

† See Plate VIII. *e.f.*

had much power in conveying the nervous influence, I cannot determine. About a fortnight before the amputation of the limb, I pressed on the part where the nerve was divided, and the patient said he felt it quite down his leg.

Though the operation in this instance did not prevent the necessity of amputation afterwards, yet it must be allowed to have answered so well, that under more favourable circumstances, as when the disease is confined to the soft parts only, or the bone is not much affected, it may be the means of preserving the limb. At all events, the operation is so simple, and attended with so little risk, that I think it deserves to be tried before amputation of the limb is determined on, as the latter operation can by no means be affected by it.

As where much irritation has existed in a nerve and the surrounding parts, there is a greater disposition both towards the reunion of a divided nerve and the regeneration of a portion of one that has been removed, it becomes necessary to cut out so large a portion of a nerve that its restoration shall not very quickly be effected. As far as I can judge, should there be an extensive ulcer, and the nerve was to be merely divided, it would, in all probability, become reunited before the ulcer could heal; and

should this prove to be the case, the same symptoms would be re-produced, and no benefit derived from the operation. Whether the restoration of the nerve be advisable or not, I am at present unable to determine; but should this be so, only a small portion should be removed.

It is not impossible that either too much or too little may be removed. In the first case, the cicatrix may be liable to ulcerate again, as parts are apt to do when deprived of the nervous influence; in the second case, the cicatrix might resume too great an irritability, and on this account become again ulcerated.

In removing a portion of nerve, it is advisable to do it as far as possible from the ulcer, because there is a much greater probability that the external wound will heal by the first intention, and consequently the cut ends of the nerve escape inflammation and ulceration. It is also advisable to divide the nerve as near to the upper part of the wound as possible, as the end of the nerve will thus retract from the wound, and, consequently, be less liable to become inflamed, should the external wound have assumed this disposition.

CHAP. IV.

ON A SPECIES OF PARALYSIS.

PARALYSIS most commonly arises from some injury or disease, either of the brain or medulla spinalis, or from a division of the nerves; but though this is generally the case, yet there is another species of paralysis which is produced by an enlargement of a portion of nerve, and is usually attended by much pain. As an example of this disease, I will relate the following case.

CASE.

David Franklyn, aged twenty-two years, was admitted into the County Hospital, about the middle of October, 1820. He said, that seven years before, he was holding a horse, with the halter tight round his hand, when the horse running back the wrist was injured, and became immediately bent. The part was violently pulled after the accident, and thereby further injured. He had great pain in the wrist and palm of the hand ever after, and a slight pain at the back of

the hand. The skin at the back of the hand was injured, and was continually ulcerating. The thumb and three fingers were always bent towards the wrist, and could be extended only in a very small degree, and the sense of touch was lost. As the hand was quite useless, and the source of much inconvenience, I amputated it, and the part soon healed.

On examining the hand, I could not perceive any other alteration in the carpal joints, except what would arise from their being kept constantly bent, and it did not appear that any serious injury had been inflicted on them. The muscles in the anterior part of the fore-arm had contracted a permanent shortening. The median nerve*, where it passes under the annular ligament, was much enlarged, and its natural † connexion with the sheath of the tendons of the flexor muscles of the fingers thickened. Several of the digital nerves, towards their termination, had a gangliform enlargement.

In this instance, it is probable, that if the joint had been kept quiet at first, and leeches and evaporating lotions had been used to subdue the inflammation, the hand might have been restored to its healthy state.

* See Plate IX. *b. b.*

† See Plate IX. *c.*

In further elucidation of this disease, I will relate the following circumstance.

A dog had a paralysis of the right fore leg, which came on when it had the distemper. This limb was entirely useless, but it was affected by frequent involuntary contractions of its muscles. Except this affection, the dog had been for some time perfectly recovered from the distemper, and was in good health at the time it was killed.

I carefully examined the brain and medulla spinalis, and the only difference I could discover in the appearance, from what it ought to have been, was an evident diminution of size of the left testis *cerebri*. I then examined the limb, and found a considerable enlargement of the cervical nerves before they formed the axillary plexus, though this plexus had no altered appearance; but all the nerves going from it were much smaller than in the opposite limb.

I have been consulted by several patients who have complained of great pain in the arm, especially about the deltoid muscle, and an inability to raise it, as though the muscles were affected by paralysis. These symptoms have continued for a great length of time, and in some instances have never entirely gone off. In some I have supposed the pain and paralysis to proceed from

the enlargement of the circumflex nerve, somewhat the same as in the median of David Franklyn; in others it has seemed to be most in the musculo-cutaneous. In more than one instance, the pain was much aggravated by any surprize.

I have found blisters repeatedly applied to the arm, and ointment with tartarized antimony, the best remedies for removing the pain. After which, it is of advantage to give passive motion to the arm, and at the same time to improve the general health as much as possible by tonics.

CHAP. V.

ON TIC DOULOUREUX.

I HAVE seen several severe cases of this complaint which no means seemed to lessen ; and it was only when the teeth on which the disease depended had been extracted that the symptoms yielded. Many people are unfortunate in being obliged to lose several teeth before the right one is discovered, but the diseased one may generally be known by striking the teeth with a piece of iron, or by feeling between them with one of the bent instruments used for filling decayed teeth.

In one case where the patient suffered the most excruciating pain in the tongue and throat, and could only swallow with the greatest difficulty, a small dead portion of alveolar process irritated the tongue. I removed this with my finger, and the pain immediately ceased, and did not return.

Several severe cases have yielded to bark ; but in one where the pain occupied the ear,

neither the bark, extract of stramonium, or carbonate of iron, had any effect. I should observe, however, that the patient would not persevere in the use of the carbonate of iron, in the manner recommended by Mr. Hutchinson.

There are very few nerves in the body that may not be affected by this disease. I have seen two cases where the branches of the second cervical nerve were affected, of which the following is an instance.

CASE I.

Miss G., about forty years of age, for more than two years had a slight fulness, not so large as a sixpence in the right side of the neck, just where the branches of the second cervical nerve pass over the sterno-cleido mastoideus muscle. This part was painful, but for a great length of time the pain was moderate, and seemed to be relieved by wearing on it a bit of opium plaster. About the 17th of April, 1821, when there was the least possible degree of fulness about the part, the pain had become so severe as to be very distressing. It was the most violent at the back of the ear, but was felt likewise at the back of the head. It went also to the inside of the meatus auditorius externus, and sometimes to the

gums, and the tongue had constantly the sensation of being scalded.

For the first few days she took two scruples of powdered bark every four hours, after which the dose was increased to a drachm. This was continued regularly for a fortnight, and the pain was much alleviated. Her stomach was disordered, and she took occasionally five grains of blue pill; and as she loathed the bark, she took ten drops of the muriated tincture of iron every four hours for a month. After this she had a slight return of pain, but it lasted only for a short time; and she has lately been quite free from it, only feeling it if her neck is too much exposed to the cold air.

In the following case of popliteal aneurism, there appeared to be the same affection of the sciatic nerve as in tic douloureux.

CASE II.

Charles Chelsop, aged thirty years, was admitted into the County Hospital on the 14th of August, 1820, with an aneurism in the right ham. He dated its commencement from a fall he had from his horse about twelve months before. The aneurism had been very painful for the five weeks preceding; and at the time

of his admission the whole leg was oedematous, and in a state of inflammation, but these symptoms were considerably diminished by confinement to bed, and taking some purging medicine.

On the nineteenth I tied the femoral artery, with a single ligature of such strong silk as is usually employed for tying false teeth. The ends of the ligature were left hanging out of the wound. The greatest part of the wound united by the first intention. There was no disorder of the constitution. The ligature came away on the fifth of September, when, as the wound appeared healed, he walked out of doors, and was discharged from the hospital quite well on the ninth.

For the five weeks before the operation when I have mentioned the pain became so violent, he told me it came on in the leg every night about half past ten, and went off about two in the morning. It appeared to be entirely in the sciatic nerve. This might have been accounted for, by supposing him to have lain so as to press the nerve in the upper part of the thigh, as it always came on in the night; but it returned just at the same time for several days before the operation, when he was entirely confined to his bed. It was never felt after the operation.

All local affections of nerves appear to come on, or at least to be aggravated periodically. Why this should be so, it may be perhaps difficult to explain. It may be, that a nerve cannot at first bear a diseased action continually without rest, any more than it can a healthy one, and therefore the diseased action, after a certain period, ceases to make any impression, or at least a much fainter one. But after this rest, the nerve again acquires power, and is again fitted for the same action. As the eye, from repeated trials, can discern what it could not at first, and the ear perceive sounds which before made no impression, but can afterwards be easily recalled, so the nerves, after receiving morbid impressions for some time, become afterwards more readily affected by the same causes which first produced them. In the case of Charles Chelsop, the structure of the nerve could not have been altered from the pressure of the aneurism; but I conceive the aneurism irritated it, and at the particular time of the approach of violent pain, there was an increased action of the blood-vessels of the nerve. I cannot help supposing, that in tic douloureux there is a sudden irregular action of the blood-vessels of the nerve, which produces the violent pain, and that this is effected in the same manner as dizziness is in the eye,

from an increased and irregular action of the vessels of the choroid coat. But the nerves of the senses not being subject to pain like the other nerves, in dizziness pain is not felt in the eye. That the blood-vessels have a principal share in the production of painful affections of nerves, may be inferred from their increased size in nerves that have been affected by much pain. Many examples of this kind might be produced. In the musculo-cutaneous nerve*, Mr. Hunter was obliged to use a ligature to stop the hemorrhage, which never could have been necessary in a sound nerve. In the case of William Richardson†, the external popliteal nerve bled very profusely; and a portion of this nerve was much redder from vessels than I have ever observed in a sound nerve.

If the nerve in tic dououreux is affected by its blood-vessels in the same manner as the retina is by the choroid coat in dizziness, tic dououreux ought to arise from a too plethoric state of the body, as well as from a debilitated one; and this, in fact, is sometimes the case, though rarely. When I have observed it in a

* Transactions of a Society for promoting Medical and Chirurgical Knowledge, vol. ii. page 154.

† See page 28.

patient of this description, and with a tendency to apoplexy, I have cured it by purging. It may appear strange that a complaint of this sort should be produced by two such opposite states of the body, and that it should continue longer in a debilitated person than a plethoric one : but when the body is strong, the nervous system is generally not irritable : slight occurrences do not easily affect it, so as to produce any disturbance in the sanguiferous system ; whilst, on the contrary, in the atonic state of the body the brain and nervous system are generally very irritable, every little thing agitates the patient ; and the action of the heart is easily hurried, which tends to increase the irritability of the brain and nerves, by causing the blood to flow to them at irregular times.

CHAP. VI.

ON DIZZINESS.

OF all the milder complaints to which man is liable, there is no one more troublesome than dizziness. The sensation it produces is not only very disagreeable, but it often comes on so unexpectedly as entirely to incapacitate the patient from proceeding with any business in which he may happen to be engaged.

When it comes on frequently, I have found it very difficult to cure by the means usually employed for that purpose. As I have in several obstinate cases removed it, I think it may not be useless to relate what has occurred to me on the subject.

When a person has become subject to dizziness, though he may in the first instance have been relieved by bleeding, yet should the complaint soon return, and especially if the body is much debilitated, a farther loss of blood will not only not relieve it, but will, on the contrary, increase it. In many cases the usual remedies

may be employed with advantage ; but there are others in which the complaint is continued from habit, as is the fact with many affections where the functions of the nerves are disordered : in those the habit must be interrupted by every thing that can improve the general health ; and, with this view, I have several times given, with success, from half a drachm to a drachm of powdered bark every four hours ; at the same time allowing a generous diet, with the use of wine. I have often thought malt liquor prejudicial.

Instead of dizziness, or accompanied by it, some people will have a very confused sensation in the head, attended with debility of body, restlessness, palpitations of the heart, and mental irritation almost amounting to insanity ; which I have known to be cured by the same means as in the following case, for many particulars of which I am indebted to Mr. Franklyn, with whom I attended the patient.

CASE.

Mr. W., about forty years of age, had been troubled with palpitation of the heart for some time, so much so indeed, as to lead to a supposition that this organ was diseased. He was affected suddenly with fainting, so as to be

obliged to keep in a recumbent position. His head felt generally uncomfortable, and he was sometimes dizzy, and sometimes complained of pain in his face and a painful tightness and soreness of the forehead and top of the head, and inconvenience when he brought the occipitofrontalis muscle into action. The eyes felt stiff in their sockets, and as though the globes were too large. He was very irritable, so that the mention of any calamity, though it did not in the least concern him, rendered him highly uncomfortable. The sound of any musical instrument irritated him exceedingly; and indeed his mind was nearly bordering on insanity. He seemed debilitated, but in other respects his body was healthy. When most affected, he was always relieved by lying on the right side, and admitting the cold air. He frequently had a sensation as though the lungs were elevating, and occasionally complained of a spasmodic stricture of the throat, similar to what is experienced in the *globus hystericus*. His bowels were regular.

He was at first ordered to take half a drachm of powdered bark every four hours, and this dose was increased to two scruples. He was advised to take as much nourishment as possible, and several glasses of wine daily. This plan seemed

immediately to relieve him. Some months after, he made use of sea-bathing, which was of great service to him, and he is now quite well.

I could relate other cases where complaints in the head, which had rendered the patients uncomfortable for a great length of time, were cured by the same means; and I think it not improbable that a somewhat similar mode of treatment might be useful in some species of insanity.

CHAP. VII.

ON DISEASED APPEARANCES IN THE SPINAL
CANAL.

THE dissection * of the parts contained within the spinal canal is attended with so much trouble, that, until within these few years, its

* When it is necessary to examine the spine, for the purpose of ascertaining the exact state of the medulla and its membranes, it is, in my opinion, very material to cut away the bone, without wounding the dura mater. And I conceive this may be accomplished with perfect ease in almost every instance where moderate care is taken. The manner in which it has occurred to me to do it the most easily, and in the least time, is, to place the subject so that the head may hang over the edge of the table, and then, after having made an incision through the integuments from one end of the spine to the other, to separate the muscles from the spinous processes, and to remove as much of the muscle as can be conveniently done. Each spinous process should then be cut off close to its base, with a chisel and mallet. The canal must then be opened, by sawing a little on each side of the bases of the spinous processes, but not quite into the canal; the portions of bone thus marked out may be divided with a chisel and mallet, and very easily removed with a pair of very strong forceps, and thus the whole spinal canal may be laid open before the dura mater is cut into. In young children it may be easily opened with a pair of strong scissors.

diseases were comparatively but little investigated. In some complaints, and especially tetanus, diseased appearances of the membranes of this part have been found; but it always seemed to me doubtful how far these appearances might arise from accidental causes. As conclusions cannot satisfactorily be drawn from a few cases, and as numbers can only be supplied by many individuals, I conceive the following accounts may not be useless.

CASE I.

Cornelius Bishop's son, aged eight months, was brought to me on the tenth of August 1821. He was taken a few days before with vomiting and fever, and when I saw him on this day his head was bent back so as to form a complete opisthotonus, and it could not be moved forward, as the muscles appeared quite stiff. He appeared insensible. The pupils of the eyes were dilated. There were frequent convulsive motions of all the muscles of the body, but most particularly of those of the face. His head continued bent back until his death, which happened on the 25th of August. Immediately after death the head could be moved in any direction.

As the stools were black, some doses of submuriate of mercury were given him, and these

had the effect of changing the secretions to a more healthy state. A blister was applied to the back of the neck.

EXAMINATION.

I examined the body twenty hours after death. On opening the head, the fontanelle was much wider than it should have been. There was a great quantity of fluid in the ventricles of the brain. In other respects the brain appeared healthy, and not redder than natural.

On opening the spinal canal, three patches of a reddish substance, about the surface of a horse bean, lay on the dura mater, about the beginning of the dorsal vertebræ, but I could not decide whether this was owing to disease. On cutting open the dura mater, it appeared sound and healthy, and the tunica arachnoides was sound as far as about the first dorsal vertebra; it then was thickened, and opaque, and had coagulable lymph effused on it as far as the beginning of the cauda equina. The pia mater appeared to have been involved in the disease. The morbid appearances were confined to the posterior part of the medulla. The whole of the abdominal viscera were perfectly healthy.

CASE II.

James Cawthorn, aged twenty-five years, was hanged for murder on the 9th of August, 1821. On opening the spinal canal, the dura and pia mater were quite sound, but the tunica arachnoides had several patches of a cartilaginous substance on it.

On opening the abdomen, the stomach was contracted, and its villous coat was very red, and about the cardia appeared as if corroded by the gastric juice. The examination of the stomach took place about two hours after he was suspended.

The brain was sound, except the tunica choroidea, in each of which was a yellowish tumour, about the size of a large pea. There was much fluid in the ventricles.

On the pericardium of the heart there was a whitish appearance in several places, as if there had formerly been inflammation; and on the loose pericardium there were several whitish spots.

He was confined in the jail for many weeks, and during all this time was in perfect health. He ate and slept well, and got much stouter than when he was first committed. A strong instance this to prove that similar appearances of the membranes of the medulla spinalis are certainly not the effect of tetanus, and ought not, without sufficient enquiry, to be considered as the cause of it.

CASE III.

Benjamin West, forty-five years of age, was admitted into the County Hospital on the 25th of March, 1822, on account of epileptic fits. He said he began to be troubled with them seven years ago; that they continued three years and then left him, and did not return until a year ago. He had no attack during the time he was in the hospital, but complained very much of his head.

He was seized with erysipelas on his right side on the 8th of April, which extended over the greatest part of the back; and terminated in mortification. He died on the fourteenth.

EXAMINATION.

I examined the contents of the cranium and spinal canal twenty hours after death.

The longitudinal sinus terminated in the left lateral sinus, and there was a communication between the two lateral sinuses very little larger than would admit the blunt end of a probe. The right lateral sinus appeared to be a continuation of the torcular Herophili. This arrangement, as far as I could judge, must have tended to retard the return of the blood.

The whole tunica arachnoides covering the

convolutions of the brain was very opaque, and much thickened, especially on each side the longitudinal sinus, where it had the granulated appearance in a very great degree, and I could not help thinking but that it was the effect of previous inflammatory action. Some small patches of cartilaginous matter were observed on it. At the base of the brain it was as little altered from its healthy state as possible. There were some small hydatids in the plexus choroïdes. The whole brain was sound. There was very little fluid in the ventricles, but some was contained between the dura mater and tunica arachnoides, and after the brain was removed, rather more than an ounce was collected about the foramen magnum.

The dura mater of the medulla spinalis on the outside was sound, but on its inner surface there was one small scale of cartilaginous matter. The tunica arachnoides adhered very much to the dura mater within the cervical vertebræ, and there were many adhesions through its whole extent, especially on the posterior part. There were several scales of cartilaginous matter on it, the same as in the preceding case. In other respects, the contents of the spinal canal were sound.

CASE IV.

In the dissection of Cornelius Bishop's son, I have described* three patches of a reddish substance, which lay on the outside of the dura mater. I have frequently observed similar appearances in different parts of the spinal canal, but most particularly in the inferior portion, and therefore I cannot at present consider them as the effects of disease. But, in dissecting the body of a man whose lungs were very much diseased, I found such an appearance† covering all the posterior part of the dura mater of the spinal canal, and it was in a much greater degree than I had ever observed before. I did not find pus in the spinal canal, but there was a fluid very much like it at several of the inferior spinal holes. On opening the dura mater, many adhesions‡ were found between it and the tunica .

* See page 51.

† In the third volume of the Medical Observations and Inquiries, a case of paraplegia from injury is related, in which the symptoms seemed to arise from a similar disease.

‡ In a man supposed to be consumptive, but in whom all the viscera were sound, nothing remarkable was observed, except adhesions of the tunica arachnoides of the medulla spinalis to the dura mater. The dura mater of the head was thicker than usual, and the brain very soft. Morgagni Ep. 49. obs. 16.

arachnoides, and especially as far as it is contained within the cervical vertebræ, and some of these, more particularly on the posterior part, were long, like threads. Some bloody fluid was found in the inferior part of the sheath. The left lung was very much diseased, and adhered to the ribs, which formed the boundary of a large ulcerated cavity, and I thought it not improbable that diseased action might have been communicated from this to the spinal canal. On account of this disease, there was some difficulty in separating the branches of the grand sympathetic nerve on this side of the chest. The pleura was very much thickened, and the phrenic nerve of the left side was thickened, and with difficulty separated from it. I have known hiccup very troublesome in complaints of the chest, and I conceive it may be produced from disease communicated to this nerve. I did not know the history of the case.

CHAP. VIII.

ON INJURIES OF THE MEDULLA SPINALIS.

CASE I.

JOSEPH LARDER, of Scothern, thirty years of age, was admitted into the county hospital, on the 14th of May, 1821. About a week before his admission, he fell from a tree, and fractured the spine about the second dorsal vertebra. At first he complained of very great pain at the injured part. The spine had a curved appearance, and one spinous process projected much, and an indistinct crepitus could be perceived when an attempt was made to move it. There was a complete paralysis of all that part of the body below the fracture. The urine was obliged to be drawn off with the catheter, and the stools came away involuntarily. At first he had much difficulty of breathing, and now and then vomited. The symptoms already enumerated continued till within two or three days of his death, with very little variation, except that the

vomiting was almost continual and very distressing, and that his lower extremities became quite cold and purple, and appeared exactly like a limb that has mortified in consequence of a too feeble circulation in cases of aneurism.

He never complained of pain either in the chest or abdomen, and always expected he should recover until the day before he died.

After death, the purple appearance of the skin of the lower extremities went entirely away, so that it looked perfectly natural.

He died on the 31st of May.

EXAMINATION.

On dissecting away the integuments over the spine, coagulated blood was found, which had also insinuated itself amongst the muscles. I then removed the projecting spinous process, which was loose, and had the superior and right articulating process attached to it. Several small portions of bone were likewise detached. At this vertebra, viz. the second dorsal, the dislocation was such, that the medulla spinalis became firmly compressed against the posterior and inferior margin of the spinal canal of the next vertebra; and at this part the medulla was nearly divided.

Just below this it was enlarged, and had an appearance as though the part above had been pressed towards it. Some coagulated blood was on the outside of the dura mater, and when this membrane was divided a fluid escaped.

On opening the chest both lungs appeared diseased; in some parts as if thickened by inflammation, and as if coagulated blood had been effused into their substance. Much bloody serum was in both cavities. The pericardium of the heart was inflamed, and adhered to the loose portion.

On opening the abdomen a great quantity of serum was found mixed with purulent matter. The peritoneal coat of the intestines was inflamed, and adhesions were formed between the convolutions. The sigmoid flexure of the colon adhered to the bladder; and, on separating these adhesions, an abscess was found to have formed between them, and the ulceration of this part had nearly extended into the gut, and likewise nearly through the posterior surface of the bladder. There might have been, and it is very probable there was a very small opening in the bladder, which allowed the urine to pass through at this part, though I could not find it.

When the bladder was cut into, its sides did not fall into contact, but remained separate, and

appeared as though the cavity had not varied in size for some time. Much matter had long been discharged with the urine, and a great part of the urine passed off as it was secreted.

In this case, the nerves seemed to have retained their sympathetic power from the very distressing vomiting which came on before the patient died, in consequence of the disease within the abdomen, and which would have accompanied it in the same way, had the medulla spinalis been perfect. As pain did not attend the vomiting, we must suppose either that the grand sympathetic nerve has but little feeling, or that it is not prone to pain. Should this not be allowed, we must suppose that its feeling or sensibility is derived from the medulla spinalis. The experiments made by Bichat seem to prove that it is not easily affected so as to become sensible of pain. Ulcers are frequently found in the bowels, without having produced that degree of pain we might have supposed. But on the contrary, the strangulation of a portion of bowel in a hernia, and other diseases, causes the greatest torments; and though many diseased appearances have been found in the heart, which had not been attended by much pain, yet the reverse has been as often observed; and this would lead us to conclude that such diseases

being unattended by pain, is owing to some peculiarity in the disease itself.

When an infusion of tobacco is injected into the bowels, its effects, I conceive, are produced through the medium of the grand sympathetic nerves, for the parts which these supply seem to be always first affected, afterwards the nerves of voluntary motion, and lastly the brain. When its effects reach beyond the viscera, are they not conveyed through the spinal nerves to the medulla spinalis, and from thence to the brain ?

CASE II.

Colonel Sibthorp, forty years of age, was overturned in his carriage about eleven o'clock in the evening of the twenty-third of February 1821. I saw him with Dr. Cookson about an hour after the accident ; he was cold and faint, and complaining of great pain between the scapulæ, but of none in his head. He could move his right leg and arm, but could not move his left leg at all, and his left arm only very little. He complained of a tingling in both arms, and very much of the cramp in his left leg ; indeed it came on so violent, that he was obliged to have it held. He was rather sick, and vomited a little. He had no difficulty in

passing his urine.* On examining the spine he experienced much pain when pressure was made on the left side of the spinous process of the first dorsal vertebra, but the same pressure did not produce pain on its right side. Two hours after the accident twelve ounces of blood were taken from the arm, but it flowed very slowly as the circulation was feeble. He took thirty drops of laudanum, and, as he vomited soon after, we gave him ten drops more, and left him at half past three A. M.

February 24th. I saw him with Dr. Cookson and my brother at ten A. M. He had had some sleep towards morning. He had still some spasms in the left leg, and the tingling continued in both arms. The pulse was not much quicker than natural, but was rather full. He complained of pain towards the left side of the lower part of the abdomen. Twelve ounces more of blood were taken from the arm, and he was ordered to take two drachms of sulphate of magnesia dissolved in an infusion of roses every four hours.

8 P. M. The spasms in the left leg are less

* Though there was no difficulty in voiding the urine, yet it did not flow so freely as it should, and for some time when the inclination came on, there was an immediate necessity for voiding it.

frequent, and the tingling in the arms rather less. He has more feeling in the left leg, and has less pain between the scapulæ, and in the abdomen. He feels more comfortable, and has had some broth and pudding. Pulse 72 quiet and good. He took only one draught as it produced sickness. He was ordered a draught with thirty drops of laudanum, and a pill with four grains of submuriate of mercury, to be taken at bedtime.

25th, ten o'clock A. M. He has not had an evacuation from the bowels since the accident. Pulse 66. He has had much sleep in the night, and less pain between the scapulæ, but still has the same tingling in the arms. He can move the left arm better, but has not the least power of moving the left leg; he has, however, perfect sensation in it, as far as touch is concerned, and when I put a glass to it containing cold water, he said it felt cold.

He was ordered to have twelve leeches applied to the injured part of the spine, and to take another draught with sulphate of magnesia.

8 P. M. Symptoms the same, the draught was vomited up, and he has not had a stool. He was ordered pills composed of submuriate of mercury, and compound extract of colocynth.

26th, 10 A. M. He has had a tolerable night, but no stool. Pulse rather quicker. He was ordered an enema.

In the evening pulse 70 and quiet. He has had two plentiful stools, and in consequence is much more comfortable. His left leg feels rather more like itself, but the tingling in the arms is the same. He does not complain of pain between the scapulæ except on pressure.

27th. Symptoms the same. In the evening he thought the tingling in the right arm rather less, but the same in the left. He could move the left foot a very little. He had six leeches applied to the spine in the morning, and was ordered to take some purging pills at bedtime.

28th. He has not had a motion, and was therefore ordered to take more pills; in other respects he is the same as yesterday. In the evening he had a motion. The tingling in both arms continues the same, but he can move his left arm and leg rather more.

March 1st. Symptoms the same, except that he complains of pain in both arms, and at the short ribs on the left side.

2d. He had six leeches applied to the spine; in the evening he was very faint, but his other symptoms were the same.

3d. Symptoms the same. Hitherto he had lived on a very low diet, but this day he had a little fish.

4th. The tingling in the arms continues, but he has more use of his left leg. He had broth and chicken to-day for dinner; in the evening his pulse was 80, and rather full.

After this he improved daily. He had not sensation in the right hand so perfect in the little and inner side of the ring finger, as in the other parts. In the left this distinction was not so perceptible. He began to have his left arm and hand rubbed with a flesh brush and a spirituous embrocation. The tingling appeared to be greatest at the inside of the arm and in the fingers.

April 1st. He walked a few steps without assistance, and from this time kept gradually improving in walking.

In May* he complained of a numbness in his right side, but not in the left, and this continued for some time. At this time I again examined the spine, but could not perceive any irregularity in the bones, and indeed I never could, though I had examined it frequently

* At this time I thought a seton made near the seat of the injury might have been useful, but it was not consented to.

with the greatest care. When the accident first happened, I could never perceive any crepitus or other symptom that could induce me to suppose that the vertebra was fractured, unless the pain on pressure of its left side would lead to such a supposition.

It appeared most probable that the symptoms in this case were chiefly produced by an effusion of blood, and that a coagulum pressed very much on the left side, and only slightly on the right, and on the right principally on the portion of the medulla that gives origin to the seventh cervical and first dorsal pair of nerves: and the circumstances of the ring and little finger being most affected, and the tingling being greatest in those parts, and in the inside of the arm, in the direction of the internal cutaneous nerve, seem to favour this opinion. From this also it is probable that each nerve has its origin from a certain portion of the medulla spinalis, which is a centre or source of influence from which and to which the nerves propagate their actions. On the right side none of the parts below the injury suffered the slightest alteration in their functions. The whole medulla from which each axillary plexus arises, was affected, but the injury was very slight on the right side, for extensive motions of the right superior extre-

mity could be easily made, though the finer movements of the hand could not be executed with the precision they were previously to the accident. Writing that was made a few days after the accident, was very imperfect, and could be only just recognised as the writing of the patient; but this daily improved, and in about three weeks was as good as before the accident.

The left leg improved much faster than the left arm, though at first it was entirely deprived of motion.

If each nerve did not receive its powers from the corresponding portion of the medulla, we can hardly conceive that the parts furthest below the injury should first recover, and afterwards those immediately interested. It must appear from this also, that the communication between the brain and medulla spinalis for the production of sensation and voluntary motion, can be carried on if the medulla is only injured to a certain extent, and before it is sufficiently recovered for the nerves immediately arising from it to produce their proper effects. If voluntary motions depended entirely on any particular organs placed in the brain, and were only prevented from taking place by the imper-

feet transmission of their actions or commands at the injured parts, it would have been impossible in this case that the lower limb should have recovered before the superior one. I cannot doubt but that motion depends on the part of the medulla the nerves arise from, but the direction of it entirely on the will. In the beginning involuntary motions of the left leg were produced, which the will had no power of controlling. A certain degree of perfection of the brain is undoubtedly necessary for the formation of the will, for when the brain is injured by pressure from coagulated blood, and complete paralysis is the consequence, involuntary actions of the muscles will be frequently produced, though the patient cannot will the same movement of the affected parts. And a partial paralysis arising from a disease of the brain will shew, that when a small part is paralysed, as a hand, or one side of it, or one leg, the whole of the nerves have, besides their immediate centre in the medulla spinalis, another centre in the brain, or at least have communication with the brain at one particular point.

The preceding account was intended for publication some months ago, and I see no reason for altering the opinions contained in it. From

the nature of the accident, the patient's amendment was greater in the time than might have been expected. I met him very frequently walking in the streets at Lincoln at the latter end of the summer, and though his left arm continued in a considerable degree paralytic, I felt confident that time would gradually restore him the use of it ; and in this opinion Dr. Cookson and my brother concurred with me.

About the middle of September he went to London, and was advised by the medical man he there consulted to submit to a peculiar mode of treatment, in consequence of being told by him that several of the vertebræ were dislocated, or compressed inwards, and that the paralysis of the arm depended on this dislocation ; that by the peculiar process recommended, and the use of lubricating liniments, the bones might be restored to their proper places, and that then the paralysis would cease.

As part of this mode of treatment the patient was pulled and pressed for about an hour, almost daily, for several weeks. And such was the violence of the pressure, that on one occasion in particular something cracked, and it was believed at the time that a rib was broken, for immediate pain was produced, which continued

several days. My medical readers will form their own judgment as to the effects likely to be produced by such a process as this. For myself, I have no hesitation in thus publicly avowing, that I all along expressed to those who asked me, that in my opinion it was utterly impossible thus to have restored the parts to their proper position, supposing any dislocation had really taken place, which, however, I was confident was not the fact; and further than this, that in an operation attended with so much violence, there was great risk of injury to the general system, in a case where, from the nature of the accident, the parts were rendered more susceptible of morbid changes. But whatever the opinions of others might be, in the judgment of the medical gentleman himself, the process adopted was completely successful; all the bones were said to be put into their proper places, and the patient almost, if not entirely cured; debility alone remaining, which, as the cause was stated to be removed, it was expected would soon cease also.

He reached home on the fifth of December, and I visited him on the seventh. He at that time complained of vomiting, head-ache, impaired vision, and constipation of the bowels.

He said his left arm was nearly in the same state as when he went to London, and if it was improved at all, it was not in a greater degree than he thought it would have been in the same time provided nothing had been done.

He seemed desirous of trusting himself to the vis medicatrix naturæ, as in consequence of what had recently occurred, he had, with very good reason, a great aversion to the interference of art. He continued nearly in the same state until the twenty-fifth of January; the alvine evacuations were then black, and common aperient medicines being of little use to him, he took submuriate of mercury until his mouth became sore, when the colour of the evacuations changed, but his other symptoms did not abate. His sight had become gradually worse. He had continual sensations in his eyes, as if flashes of light were always before them, but the pupils contracted and dilated properly. He said he felt a general weakness. He made water with difficulty, and experienced the same want of power in expelling the fæces. It was feared that disease was going on in the membranes of the medulla spinalis and brain; and leeches, blisters, and setons were recommended to him, but their application was not consented to.

February 2d. He complained of great pain, which began at the back of the neck, and extended over the head; he had difficulty of swallowing, which he said was greatest on the left side, and when he took any thing solid into his throat, he could not get it down without the aid of liquid. Had there been no affection of the nervous system, this difficulty of swallowing might have been attributed to the soreness produced by the mercury, but I could not perceive either inflammation or ulceration in the throat, and only a slight excoriation on the left side of the anterior arch of the palate. The articulation was imperfect for a short time. Under these circumstances, and coupling therewith the previous imperfection of sight, I could not but consider him to be in a very alarming state. Blisters were applied behind the ears. Deglutition and speech became better in the evening.

February 3d. He was better, and appeared to mend for some days, but still complained of head-ache, and his left arm was much weaker. He continued to experience the same flashes of light before his eyes I have already mentioned. Blisters were applied to the temples on the tenth, which produced much swelling of the eye-lids. From this time he seemed to improve in his health, and expressed himself to his

friends as feeling more comfortable. Though he never admitted that his sight was better, yet his friends believed it to be so, as he read much more, and observed things at a distance which he had not done before. He could see best in a very strong light, and only very indifferently by candle-light. He went out two or three times in his carriage, and appeared to continue to mend in every respect, except that the difficulty of keeping his bowels open, which had been removed by the mercury, had returned.

Feb. 26th. He was taken in the night with violent head-ache and vomiting, and experienced so much difficulty of breathing, that he could not lie in bed on the night of the twenty-seventh; and on the twenty-eighth, his legs, which had shewn a disposition to swell for some time, were now much-enlarged. He had pain in the upper part of the back, and the left shoulder, and increased numbness in the arm, with involuntary motions of the left arm and leg. A blister had been applied to the back of the neck, and discharged well.

March 1st. He was rather better, and had been able to lie much more in bed. The difficulty of breathing appeared to me to arise from a deficient nervous energy. He continued much the same till the fifth, when he became exceed-

ingly restless ; he had throbbing in the temples, was drowsy, and unable to see distinctly ; he had increasing numbness of the left side, and could not remain in the same posture for more than a few minutes ; his breathing was much oppressed ; he was unable to lie in bed longer than half an hour at a time, but could lie on either side, and had very little cough ; his urine, which before had been in proper quantity, was now scanty.

In the evening the restlessness was extreme ; six leeches were applied to the back of the neck, and a mixture with camphor and castor was given him.

March 6. He was more composed. He said he had no pain, but his head felt confused, and it was all he could do to keep his recollection. The leeches were repeated, and four grains of James's powder and a saline draught were ordered to be taken every four hours. In the evening he continued more composed.

March 7. From this time to the ninth, on which day he died, he remained in the same state. In the last twenty-four hours he complained of very distressing pain at the bottom of his back.

He could hardly be said to have ever lost his perfect understanding. He became nearly blind, and for the last few hours ~~was~~ much convulsed.

His tongue was always much furred. He never had what could be called fever, and his pulse was hardly affected. Nearly the whole nervous system seemed to be gradually prevented from performing its functions, so that there never was any opportunity of using very active treatment; indeed, I feel confident, that had any quantity of blood been abstracted, the consequence would have been fatal, as on two or three occasions after being purged, he was so much exhausted as to cause great alarm. For some time, he felt he could not recover, and on that account was unwilling to submit to such treatment as we thought might hold out a prospect of relief.

He was attended, after his return from London, by Dr. Cookson, my brother, and myself.

EXAMINATION.

On attempting to remove the scalp, the tendon of the occipito frontalis muscle and the pericranium adhered so firmly together, that they could not be separated, so that nearly the whole of the bone was completely denuded.*

After having completely sawn through the skull, the dura mater adhered so firmly to it, that

* Several years ago the patient frequently complained of very bad head-aches, and he then told me he thought some disease would be found in his head. J. S.

it was with the utmost difficulty it could be separated from the bone. There appeared some marks of previous inflammation over the longitudinal sinus, and particularly on the left side.

On opening the longitudinal sinus, there was a coagulum of a whitish colour, exactly like what is observed very frequently in the heart, especially when death takes place very slowly; the same extended into some of the veins, but in these it was streaked with a black coagulum. On cutting into the dura mater, it was observed to be very much thickened in various places, but its internal surface had a particularly healthy appearance. The whole tunica arachnoides had an opaque appearance. The pia mater looked healthy. The whole brain had a healthy appearance. There was no fluid in either ventricle. Each plexus choroides was rather larger than usual, and in that of the left side was a very small tumour. The infundibulum was enlarged, and had the appearance of being thickened. There was fluid like water in the inside of the pineal gland, which, otherwise, had not an unhealthy appearance. Neither the optic nerves nor their thalami had any unhealthy appearance. The cerebellum, and all the nerves going both from it and the brain, appeared healthy.

The cellular membrane on the back was much

loaded with serum. The posterior parts of the vertebræ were denuded, both of muscle and periosteum, and no vestige either of dislocation or fracture could be perceived. The spinal canal was laid open from the atlas to about the last dorsal vertebra, before the dura mater was opened. The spinal canal was perfectly natural in every part, and no pressure could have been made on the medulla by any part of it. There was an appearance on the outside of the dura mater, forming the part of the sheath within the cervical vertebræ like coagulable lymph, but I am not aware that this is a diseased appearance, for I have frequently observed it before. The whole dura mater, on both sides, had a very healthy appearance. The whole tunica arachnoides was thickened and very opaque. At the fifth cervical vertebra, there was a very firm adhesion between the dura mater and tunica arachnoides on the left side, it was much broader, and very unlike the process of the ligamentum denticulatum. Three inches and a half from the termination of the medulla, there were several small eminences, nearly of the size of pins' heads, which had the appearance of pearls. They consisted of a substance like cream, and were contained under the tunica arachnoides. From the manner in which the canal was opened, it

was not possible for these eminences to have been produced by the parts being wounded ; but, to be satisfied that they were not, I punctured a part of the medulla higher up with a needle, and though some portion escaped through the membranes, it could be rubbed off immediately, but this could not be done in the other parts. This appearance was more or less distinct nearly to the termination of the medulla ; all this portion, viz., three inches and a half, was firmer than natural, and appeared thickened, and very near its termination in the substance of it was a small solid tumour, of a semitransparent appearance, and about the size of a very small pea.

The cartilages of the ribs were for the most part ossified. About four ounces of fluid were in each side of the chest. There were a few adhesions of the lungs to the pleura costalis, but the substance of the lungs appeared sound, but they were in an inflated state, so as almost completely to fill the chest.

The heart was larger than usual, but was perfectly sound, except that there was a small ossification in one of the semilunar valves of the aorta. There was a small quantity of fluid in the pericardium.

All the abdominal viscera were sound except the spleen, which was not enlarged, but con-

tained some small tubercles. There was a little thickening of the anterior portion of the pylorus, but it had not the appearance of disease. The inside of the stomach was perfectly sound.

After the viscera were examined, the bodies of the vertebræ were found to be exactly in their places. All the ligaments of the spine, as well as the intervertebral substances, had a perfectly healthy appearance.

The body was examined by Mr. Boot, the senior surgeon of the County Hospital, and myself, in the presence of Dr. Cookson, Mr. W. Cookson, and some of the late Colonel's domestics.

To observe the gradual diminution of the energy of the nervous system, and at last its almost total extinction, and to find after death no materially diseased part, except the tunica arachnoides, and that only changed from its healthy appearance by being a little thickened and opaque, would naturally lead to one or other of these two suppositions ; either that this membrane is in itself a very important agent in the nervous system, or that it is an index to shew the state of the parts with which it is connected, and which, in point of fact, are labouring under the same disease, though so constructed as to escape observation. Now, with regard to the

former of these suppositions, if it were true that the tunica arachnoides was spread only loosely over the medulla, as on a superficial examination it appears to be; and yet the change of appearance in it which I have described had naturally produced the violent symptoms in it stated in the preceding case; undoubtedly it must be looked upon as of such importance from its extreme sensibility of morbid changes, as to render it impossible for any one to have the nervous system perfect, when this membrane was in any way diseased. But in direct opposition to this, in the instance of James Cawthorn*, where we might reasonably suppose this must have been the case from the number of cartilaginous deposits in the tunica arachnoides, we know that no impaired functions were the consequence. I am, therefore, strongly inclined to favour the latter of the two suppositions I have stated. And, indeed, I am much disposed to believe, that the tunica arachnoides is not merely a loose covering of the medulla, but that it is reflected over both the inside of the dura mater, and the exterior surface of the pia mater. It appears to invest the pia mater closely, and to be reflected from its posterior

* See page 52.

surface to form the loose covering. The points of reflection are remarkable, and appear like adhesions between the tunica arachnoides and pia mater; and, even though the membranes should be merely united at these points, I conceive, that the connection between them is such that one could not suffer a considerable diseased action for any length of time without affecting the other. In the examination of Benjamin West*, I observed a spot of cartilaginous matter on the dura mater, exactly like those on the loose portion of the tunica arachnoides; and from its being on the inner surface, I was led to conclude, that it was situated on the tunica arachnoides, lining the dura mater. It is contrary to the order of the animal economy, for two parts or membranes, which are merely in contact with each other, to be of dissimilar structure and functions; indeed the two different surfaces would be continually irritated by the secretion of each other, and perpetual inflammation would be the consequence, until an adhesion had been produced between them. To account, therefore, for the symptoms in Colonel Sibthorp's case, I should say, that the diseased appearances of the tunica

* See page 54.

arachnoides were merely indicatory of a similar disease in the more vital parts of the medulla, with which it is connected. I think it most probable, that when the tunica arachnoides becomes changed from inflammation, whether chronic as in this case, or acute as in the case of Cornelius Bishop's* son, that the pia mater partakes more or less of the same action. The pia mater is so closely connected with the medulla, and contains so many blood vessels, as to be very unfavourable for marking those delicate changes observable in the tunica arachnoides ; but which, even in this latter membrane, would be frequently overlooked, were it not for its natural thinness and transparency. The medulla is composed of a very beautiful and delicate cellular texture, within the cells of which the medullary matter is contained. The cells are attached to, and indeed are, I apprehend, a continuation of the pia mater, or at least have their origin from it. From hence, should the same change of structure take place in the pia mater as in the tunica arachnoides, we may readily conceive how it might be communicated to the cellular structure, containing the medulla, and thus impair its natural powers ; and that this might

* See page 51.

go on in the same degree as in the loose tunica arachnoides, and yet be so little marked in its appearance in the pia mater and the delicate cellular structure, as to escape the utmost penetration of the anatomist.

The intimate structure of the medulla is of very difficult discovery. I have in vain attempted to find it out mechanically. I could observe all the parts anatomists have described, but of the medulla itself I could, by dissection, discover no more than that it was a pulpy mass. Finding thus that I could not succeed by the aid of instruments, I had recourse to chemical agents. I divided a portion of the medulla spinalis of the ox longitudinally, and immersed it in the liquor potassæ of the London Pharmacopœia. After some days the medullary matter appeared to be dissolved, when, by adding water to it repeatedly, it was washed away and suspended in the water, so as to form a fluid like milk. What remained had the appearance of membrane. I suspended this in water, and found it to be that beautiful and cellular structure which I have just mentioned. I afterwards put other portions of the spinal marrow into liquor potassæ for twenty-four and forty-eight hours; I then washed them with water, so as to dislodge part of the medulla, and immediately after put

them into rectified spirit of wine, which hardened the medullary matter left in the membranes; I then suspended them in water, and found the same beautiful and cellular structure empty, and continued from the portions containing the medullary matter. After I had done this in the ox, I could make out the same structure in the human subject. The cineritious substance is far more delicate than the medullary. The same structure exists in the brain, but it is very difficult to make it out so distinctly; and contrary to the opinion of some anatomists, I find the structure of the medulla of the spine is of a much firmer nature than that of the brain.

Dr. Maty has related the case of Count de Lordat*, who was overturned in his carriage from a pretty high and steep bank. At first he felt a good deal of pain along the left side of his neck, but after a few days he did not experience the least inconvenience from the accident. Some months after, he began to find a small impediment in uttering some words, and his left arm appeared weaker; and though the paralytic affection continued to increase, he lived nearly four years after the accident. On dissection, "we found the medulla oblongata

* *Medical Observations and Inquiries*, vol. iii. p. 257.

greatly enlarged, and surpassing the usual size by more than one third ; it was likewise more compact. The membranes, which in their continuation, inclose the spinal marrow, were so tough that we found great difficulty in cutting through them ; and we observed this to be the cause of the tendinous texture of the cervical nerves. . The marrow itself had acquired such solidity as to elude the pressure of our fingers ; it resisted as a callous body, and could not be bruised. This hardness was observed all along the vertebræ of the neck, but lessened by degrees, and was not near so considerable in the vertebræ of the thorax.”

It will be seen from the foregoing account, that the membranes were first affected, and the disease spread from these to the medulla ; and I conceive that the cellular tissue of the medulla became thickened from its being a continuation of the diseased membranes in the manner I have just been describing.

CASE III.

Solomon Lanes, of Scotter, aged twenty-two years, was admitted into the hospital on the 6th of August, 1821. He was digging gravel in a pit on the 24th of July, when a great quantity of gravel fell in upon him, and injured the spine

about the tenth dorsal vertebra. He had some use of the right leg, but the left was nearly paralytic ; he had a tingling in it, and sensation was imperfect. He had a numbness about the anus. The spine was more curved than natural, and on the left side at the curvature, the transverse process appeared to be dislocated, and he had pain when this part was pressed. This transverse process was situated much higher up than the opposite one. He was obliged to have his urine drawn off twice a day, and the stools passed involuntarily. He had a cough and some difficulty of breathing, but these were left some time before by the small pox. There appeared to have been a fracture about the head of the radius. On his admission into the hospital, the bladder was greatly distended, causing great pain. There was so much thick ropy mucus in it that the catheter was obliged to be withdrawn several times before the urine would flow freely, and, I am fully persuaded, that if his bladder had not been carefully emptied twice or three times a day, it would have become diseased, as in the case of Joseph Larder.*

The use of his limbs gradually improved, so that at the beginning of October he could get up,

* See page 57.

and by the end of the month was able to walk. The bladder and anus still continued paralytic.

At the end of December his urine was drawn off only once in twenty-four hours ; much of it passed away in the night. In the day he had pain in the bladder, after which it expelled some urine. He knew when he was going to have a solid stool ; but thin fæces passed off involuntarily. He said he had much more feeling both in the bladder and anus.

He was discharged from the hospital at the beginning of February. The use of the catheter had been discontinued for some time. He was in good health and could walk well, but the bladder and anus continued to perform their functions imperfectly, for though the bladder emptied itself, yet much of the urine passed off involuntarily.

It is an opinion too commonly received, that serious injuries of the spine very seldom admit of relief, and it is for this reason I think that so few patients of this description recover.

There are three occurrences always to be feared after an injury of the spine, any one of which sooner or later is destructive of life, and therefore their prevention ought to occupy seriously the mind of every surgeon. The occurrences I allude to are, inflammation, spreading to

the medulla or its membranes ; disease of the bladder ; and mortification of the lower part of the back and nates.

When the spine is injured the same changes take place as in injuries of other parts of the body. Inflammation, in a greater or less degree, is set up, and if the injury is below the part that supplies nerves to organs immediately necessary for the maintenance of life, it is the inflammation, I believe, which causes death, when it happens very soon after an accident. It becomes, therefore, necessary to prevent inflammation of the medulla and its membranes, by general and topical bleeding ; indeed the same care ought to be taken as in injuries of the head. The diet should be of the mildest kind, and an absolute state of rest in a recumbent position should be enjoined. It is not enough for the symptoms immediately ensuing on the accident to be removed, but attention to diet ought for some time to be adhered to, and every exertion of the body avoided, and especially riding in a carriage over rough roads. Should pain arise in the injured part, blood should be taken from it by leeches or cupping ; or should numbness or any other symptom denoting impaired functions of the medulla be complained of, blood may be taken away in the same manner ; and if the patient is

not relieved, setons or issues should be made near the part. In mentioning setons and issues I would by no means recommend their being made immediately over a fractured vertebra, unless some weeks have elapsed since the accident, as issues especially may communicate with the fracture, and make it a compound one, thus causing irreparable injury.

The urine should be drawn off twice or three times in twenty-four hours ; and if the bladder is insensible, so much greater ought to be the care taken in using the catheter, for an injury may be easily done ; and when ulceration has begun in a part deprived of the influence of the brain, nature seems to have but little power in controlling it.

Mortification of the parts below the injury must be prevented by keeping them very clean and dry, and washing them with a spirituous embrocation, as brandy, &c.

The palsied parts may be stimulated by friction, as with a flesh-brush.

When the vertebræ themselves are injured, they are, in my opinion, best left to nature.

It has been proposed to remove the portion of the bone pressing on the medulla, but, as far as I can judge, it is very difficult, even when we

know the bone is fractured, to determine that the pressure is produced by the bone.

In the case of Joseph Larder* the medulla appeared to have suffered so much injury that it is hardly probable it could have recovered from it under any circumstances ; and had the pressure been removed, the vertebræ were so much dislocated as to leave very little probability of their continuing in such a situation as not to cause fresh pressure. There would be inflammation to contend with, and if the dura mater was wounded, very probably a sloughing of the medulla, as this does not seem to resist well the effects of exposure to the air. Under all these circumstances, very little encouragement is held out for performing any operation. Should a portion of a vertebra, to which the spinous process is attached, be merely pushed into the canal, there might be some probability of success from extracting it ; but even this must be attended with much difficulty and hazard.

* See page 57.

CHAP. IX.

ON PARAPLEGIA.

THERE appears to me to be two sorts of paraplegia. The one* comes on gradually, and is almost always connected with some disease within the cranium ; the other comes on suddenly, and, as far as I can judge, arises from a disease within the spinal canal. The method of treating the former of these complaints has been pointed out by Dr. Baillie in the sixth volume of the Medical Transactions of the College of Physicians ; the latter has not hitherto received much attention from medical men, and it is for this reason I think the following case may not be uninteresting.

CASE.

Joseph Key, aged three years and nine months, went to bed, apparently well, on the 17th of February, 1821. In the night he dreamt, and his sleep was very much disturbed. Towards morning, he complained of pain in his

* I do not intend this to apply to diseases of the vertebrae.

legs *, and was obliged to be taken out of bed by his mother very early. He was brought to me about eight o'clock. I found he had entirely lost the use of his lower extremities. I desired he might try to stand, but he had not the least power of doing so, neither could he move his legs when he was placed on his mother's knee. His pulse was quick, his tongue furred. He said his head did not ache, nor did he complain of his back. I could not perceive any inflammation, or that there was any thing amiss with the appearance of the skin of the lower extremities.

I ordered six ounces of blood to be taken from the arm, which I found to be very florid, and a blister to be applied to the back; and two grains of submuriate of mercury to be taken every four hours. In the course of the day he moved his legs, and the next morning was able to walk. In a few days he appeared quite well, and has remained so ever since. The stools were at first quite black, but the blood on standing had not an unhealthy appearance.

In such cases as this there is a determination of blood to the medulla spinalis, which, if not

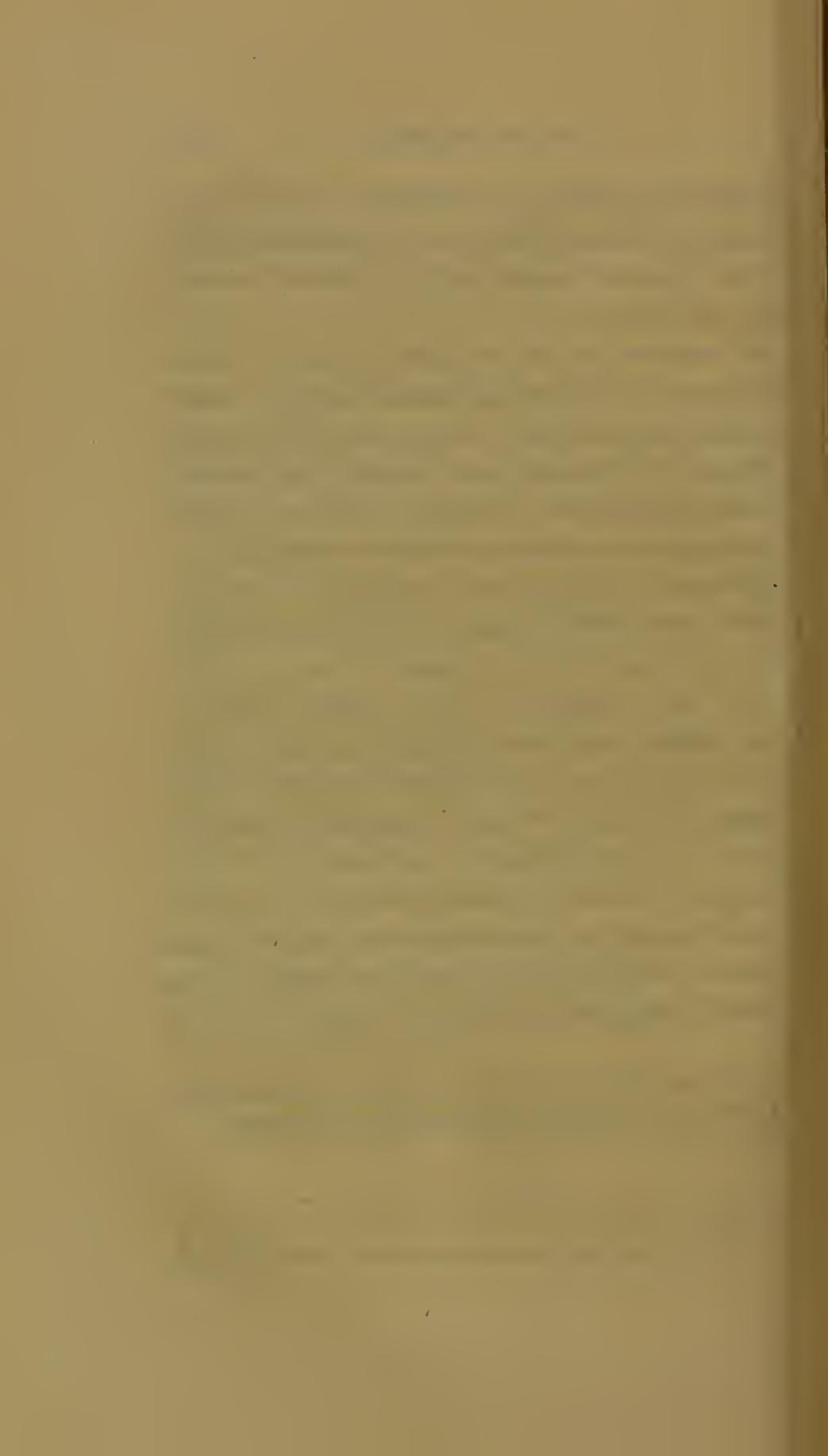
* A lady whose lower extremities were completely paralytic for a length of time, from disease of the vertebræ, complained very frequently of excruciating pain in them.

removed, produces an effusion of serum. I think it not improbable that a disordered state of the digestive organs may give rise to this undue circulation.

It may be doubted whether a determination of blood to the medulla spinalis could, of itself, produce the paralysis ; but recovery from hemiplegia, after bleeding and purging, has been so quick as to put almost entirely out of the question any pressure on the brain from extravasation.

Diseases of the nervous system are so obscure that I dare hardly hazard a conjecture respecting the cause of the symptoms in the preceding case ; but cases on record, to which I thought this similar, led me to suppose that there was a great determination of blood to the medulla spinalis, which, if not immediately relieved, would terminate either in extravasation, or an effusion of serum* ; and that then it must be a great length of time before the patient could recover much use of the lower extremities, even if the disease should not prove fatal.

* In examining the spine of a man who died of paraplegia, I found much serum on cutting open the dura mater.



EXPLANATION OF THE PLATES.

PLATE I.

Represents the nerves on a portion of the horse's face.

- a.* A branch of the fifth pair of nerves.
- b. & c.* Branches of the portio dura of the seventh pair of nerves.
- d.* Membraneous appearance at the junction of a branch of the portio dura with the branch of the fifth pair.
- e.* A similar appearance to that mentioned at *d.*

PLATE II.

Represents a portion of the gastrocnemius muscle, and a branch from the internal popliteal or sciatic nerve distributed to it.

- a.* The internal popliteal or sciatic nerve.
- b.* A branch of this nerve dividing into two others, which are distributed to the muscle, and form the membraneous and plexiform appearance described at p. 5.

PLATE III.

Fig. 1. shows a branch of the posterior tibial nerve distributing filaments to a portion of the fibula.

- a.* A branch going to the periosteum.
- b.* A branch distributing filaments to the bone, periosteum, and muscle.
- c.* Two filaments entering the substance of the bone.
- d.* A branch giving filaments to the periosteum, and terminating in muscle at *e*.

Fig. 2. was taken from a portion of the tibia in the case of William Richardson, related at p. 26.

- a.* The saphænus nerve.
- b.* A branch continued into the substance of the bone. On each side of *b.* some filaments were distributed to the periosteum, but these were removed for the purpose of showing the branch entering the bone more distinctly.

PLATE IV.

- a.* One of the digital nerves.
- b.* A branch of the digital nerve giving filaments to the ligaments, and sending one forward to the tendon of the flexor profundus muscle.

Fig. 2. shows filaments going from the radial nerve to the tendons of the posterior part of the index finger.

Fig. 3. shows filaments distributed to a portion of the pericardium of the calf.

PLATE V.

Is intended to shew the nerves of the upper surface of the foot, and more particularly the termination of the anterior tibial.

- a. a.* The continuations of the fibular nerve.
- b.* The anterior tibial nerve.

c. The enlargement of the deep branch of the anterior tibial nerve, which is drawn towards the outside of the foot to show its connection with the synovial membrane.

d. The more superficial branch of the anterior tibial nerve.

e. A branch entering one of the tarsal joints.

f. The nerve sent off from the external popliteal or fibular.

PLATE VI.

a. The anterior tibial nerve.

b. b. Numerous filaments going from the fibular nerve to the base of the fungus.

PLATE VII.

Fig. 1. shows the branch of the external popliteal or fibular nerve, which terminates on the outside of the foot, connected with the posterior part of the fungus.

Fig. 2. shows the mouths of the fungus.

Fig. 3. shows the appearance of a perpendicular section of the fungus.

Fig. 4. shows a portion of the base of the fungus magnified.

Fig. 5. shows the blood-vessels going from the base to the cells of the fungus magnified.

PLATE VIII.

a. External popliteal or fibular nerve.

b. The branch divided into the anterior tibial and fibular nerves.

c. The branch continued at the back of the leg.

d. The nerve enlarged where it was divided.

e. A branch going from the divided extremity to the surrounding parts.

f. A branch going from the divided extremity to the fibular nerve.

g. A branch going from the divided extremity to the anterior tibial, which is turned to show the connection more distinctly.

h. The corner of the anterior tibial which most probably joined the fibular at *i.*

PLATE IX.

a. The trunk of the median nerve drawn from its natural situation to show more distinctly its connection with the sheath of the tendons.

b. b. Enlargements of the nerve.

c. The natural connections to the sheaths of the tendons of the flexor muscles of the fingers thickened.

THE END.

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Printed by A. & R. Spottiswoode,
New-Street-Square.



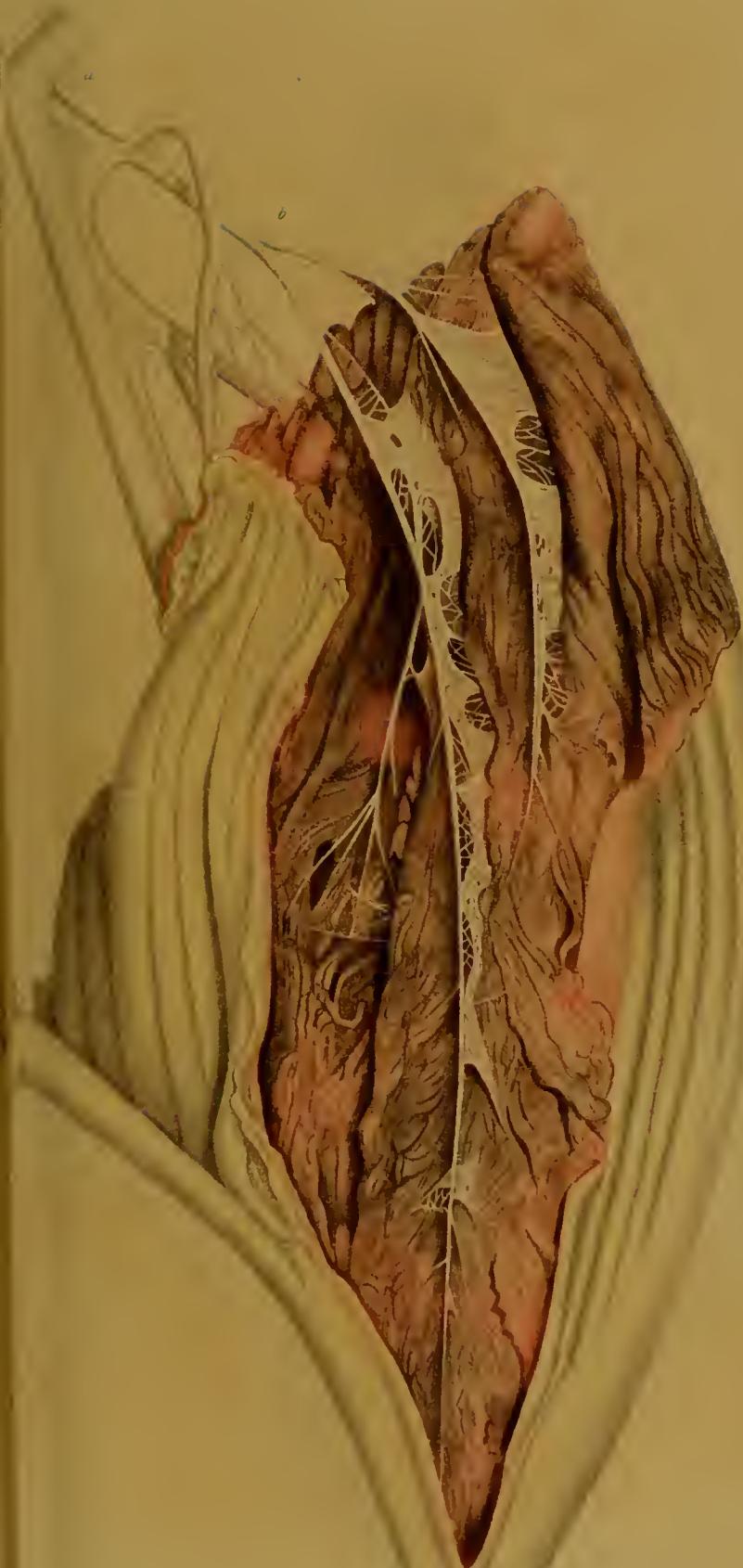


Fig. 1.



Fig. 2.



Fig 1.

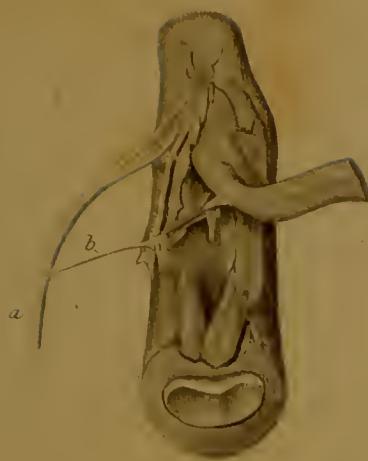


Fig 2.

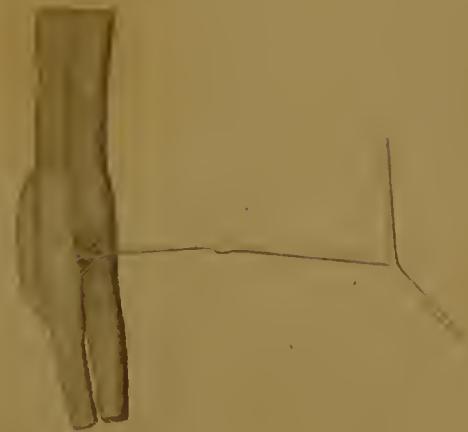
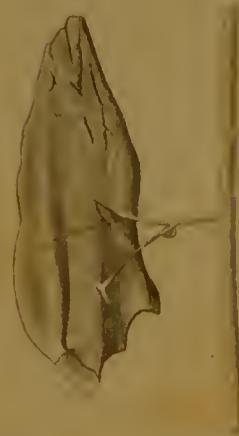


Fig 3.



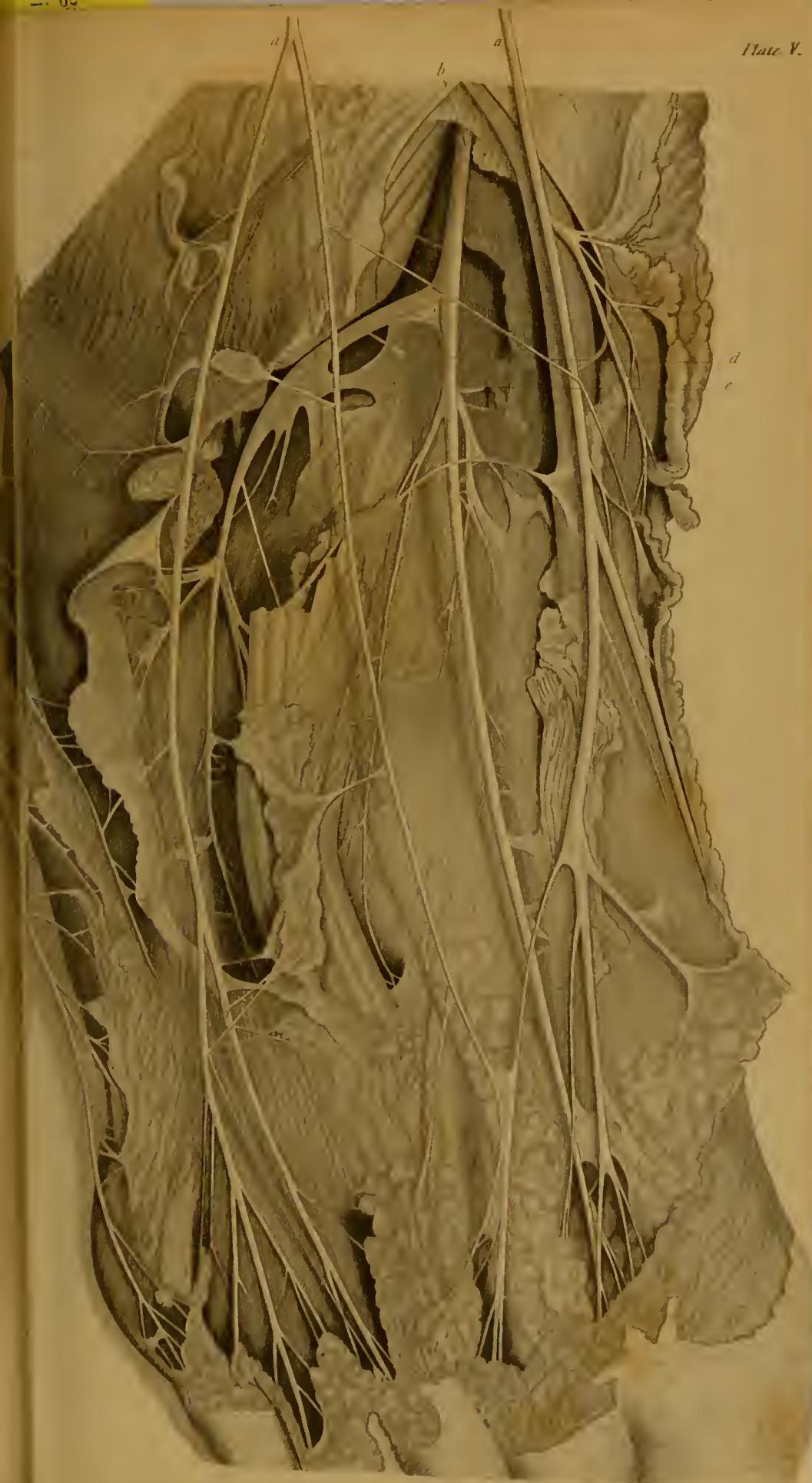




Fig. 1



Fig. 2

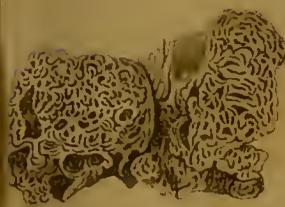


Fig. 3.

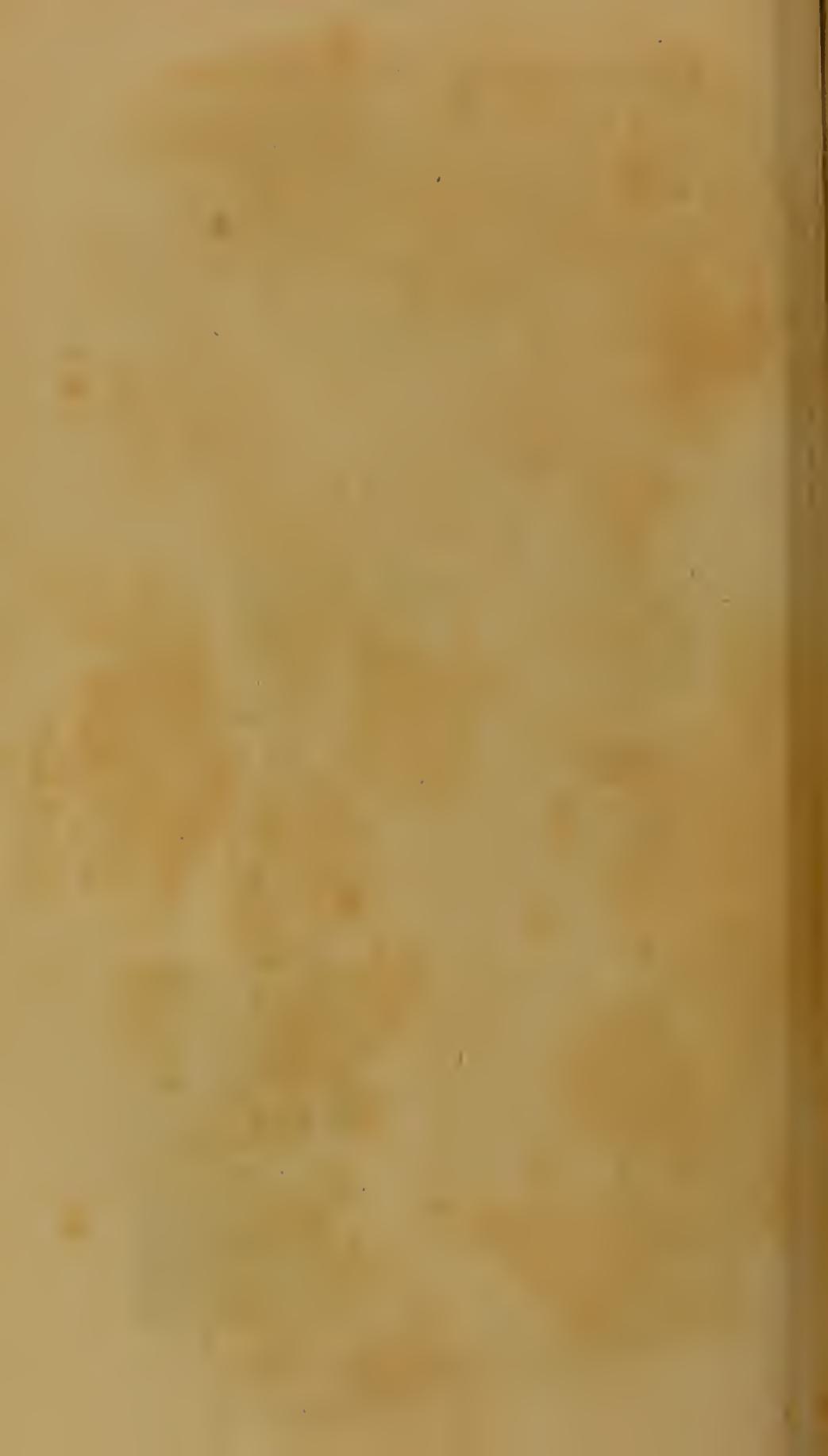


Fig. 4



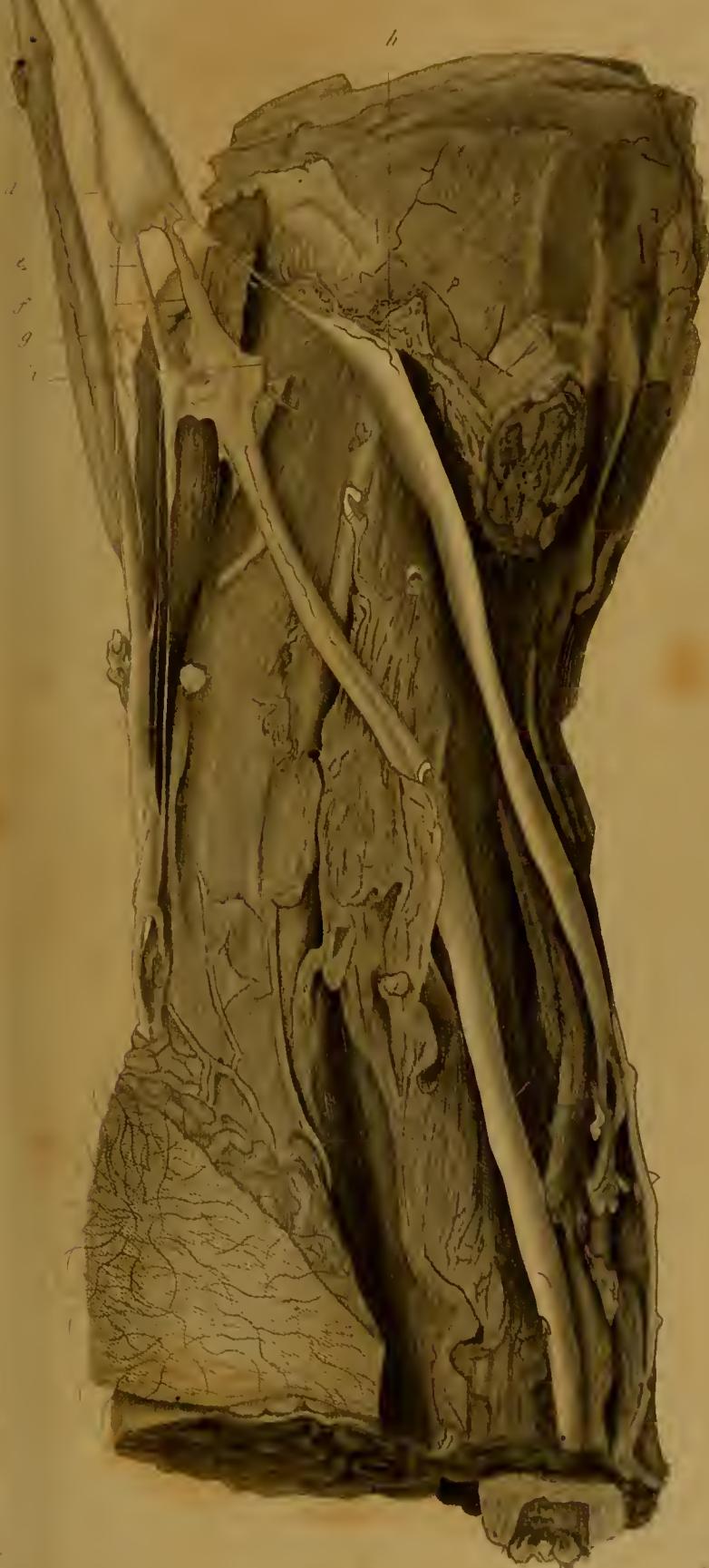
Fig. 5





b

h



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